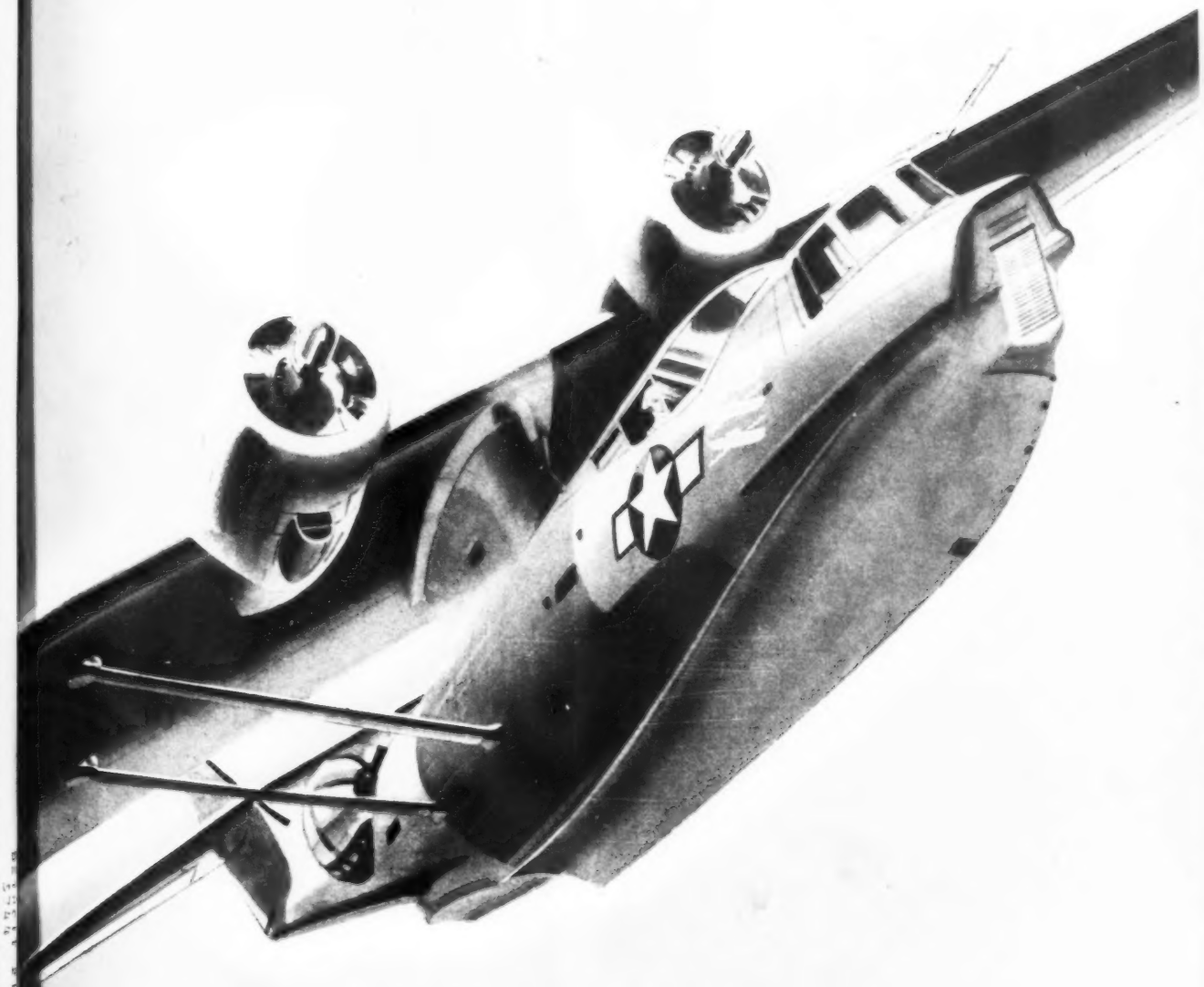
MODEL AIRPLANE NEWS



Guardian Angels

The fireworks are all over. The "Sad Sack" is nearly home. A few minutes more, and she'll put her crew down safe on a friendly field.

She went out this morning full of fight, with her belly full of bombs . . . all four motors roaring defiance at every German in Italy.

She hammered the Nazi railyards at Terni, and left them a tangle of wreckage.

But she had to take a few on the chin to do it.

When the escort fighters picked her up, the "Sad Sack" was on the spot . . . straggling behind her formation, with one engine knocked out by flak . . . trying to fight off a Focke-Wulf pack that was swarming in for the kill.

The sweetest sight her crew ever saw was that escort of P-38's . . . screaming down to the rescue with their noseguns squirting fire . . . chasing the Jerries out of there or shooting them down in flames.

That's why bomber-men call them "Guardian Angels", these escort fighter planes. For they bring back bombers and bomber crews to fly and fight again!

And that's the kind of team *you'll* be on when you wear A.A.F. wings . . . Pilots, Navigators, Bombardiers, Gunners, doing their job *together* . . . flying and fighting for the *team*, "the greatest team in the world!"

U. S. ARMY RECRUITING SERVICE

1st LT. DONALD J. JUSTER, St. Albans, N. Y. Air Medal with 9 Oak Leaf Clusters. Bombardier of the Flying Fortress the "Sad Sack".

"I'll say an escort of fighter planes is a mighty sweet sight to see! It's like the old Wild West movies—when the wagon train is surrounded by Indians and the cavalry rides to the rescue! Bombers and fighters, working together, make the A.A.F. an unbeatable team."

1st LT. JOHN D. JOYCE, Griffith, Indiana. Air Medal with 10 Clusters, Distinguished Flying Cross recommended. P-38 Pilot.

"I've helped escort the 'Sad Sack' on many a bombing mission . . . and seen Don Juster bullseye his bombs on plenty of Jerry objectives. And I want to tell you that's when *teamwork* pays off . . . teamwork that makes the A.A.F. the 'greatest team in the world'!"

MEN OF 17 . . .

You can get ready now for your place on the great A.A.F. flying team. Go to the nearest Aviation Cadet Examining Board . . . see if you can qualify for the Air Corps Enlisted Reserve. If you qualify, you will receive the Enlisted Reserve insignia . . . but will not be called for training until you are 18 or over.

When called, your special aptitudes will be studied further to determine the type of training you will receive. For the A.A.F. not only builds a combat crew from the pick of the crop, but carefully selects for each position the man with the best capabilities for the job . . . and then adds the thorough training which makes this all-star team the world's finest.

Prepare yourself in advance by taking C.A.P. Cadet Training as given by your local Civil Air Patrol. Also see your High School principal or adviser about recommended courses in the Air Service Division of the High School Victory Corps. Both afford valuable pre-aviation training.

(Essential workers in War Industry or Agriculture —do not apply.)

For information regarding Naval Aviation Cadet Training, apply at the Naval Aviation Cadet Selection Board in any Office of Naval Officer Procurement, or at any Navy Recruiting Station; or, if you are in the Navy, Marine Corps or Coast Guard, apply through your commanding officer . . . This advertisement has the approval of the Joint Army Navy Personnel Board.

KEEP 'EM FLYING!

FLY AND FIGHT WITH THE AAF GREATEST TEAM IN THE WORLD

ARMY AIR FORCES

15TH YEAR OF PUBLICATION

MODEL AIRPLANE NEWS

APRIL, 1944 VOL. XXX, No. 4

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AN AIR AGE PUBLICATION

Published monthly by Air Age, Inc., Mount Morris, Illinois. Editorial and advertising offices: 551 Fifth Ave., New York 17, N. Y. George C. Johnson, President. Entered as second class matter Dec. 6, 1934 at the post office at Mount Morris, Ill., under the act of March 3, 1879. Additional entry at New York, N. Y. Price 20c per copy. Subscriptions $2 per year in the United States and possessions; also Canada, Cuba, Mexico, Panama and South America. All other countries $2.50 per year.

FLASH

NEWS OF NEW PLANES has been released by the various governmental departments involved in a greater quantity and with much greater detail than heretofore. The new Lockheed *Lightning* represents extensive modifications to the more familiar models. External differences are the addition of deep cooling air inlets just under the propeller, replacing the smaller cowl scoops formerly used. The new scoops are similar to those used on the Curtiss *Warhawk* and are used to provide cooling air for the oil coolers. The engine coolant radiator housings have been altered and are of increased size and different contour. Major internal differences are the use of a new series Allison engine developing 1,500 horsepower, a new intercooler arrangement and additional fuel capacity. According to reports, the new *Lightning* has "30% more horsepower, 100% increase in rate-of-climb above 30,000 feet, substantial increase at lower altitudes, 30% increase in range, service ceiling raised well above 40,000 feet, level flight speed increased at all altitudes, single engine speed raised to 300 mph, maneuverability increased by the use of hydraulic control boosters, and simplification of operation by the use of automatic units on power and temperature controls." Capable of carrying two 1,000-lb. bombs, the new *Lightning* is obviously a large package of trouble for the *Luftwaffe*. . . . The Navy's Consolidated *Liberator* PB4Y-2 differs from the standard version in the use of a single, large vertical surface, replacing the familiar double tail formerly employed. Armament has been improved, with side turrets replacing the mechanically-operated "waist guns" used previously. An additional turret is mounted atop the fuselage aft of the bomb bay and special Navy detection equipment is mounted externally in a special housing under the belly aft of the nose wheel. . . . Although not creditable to a U.S. government agency, the four-year secret of our biggest "secret weapon," the Boeing *Superfortress* B-29, has been discovered by the British magazine *Flight*, which published recently the following details, wholly unconfirmed: Span, 141 feet; weight, between 100,000 and 140,000 pounds; bomb load, 16,500 to 17,500 pounds. The range of the B-29 is given as 1,000 miles with the above bomb load or 3,000 miles with a load of 6,000 pounds. Powered by four Wright *Duplex Cyclone* R-3350 engines, developing 2,000 hp each, the giant plane is tricycle geared with double main wheels on each shock strut. Regarding armament, *Flight* says that the B-29 carries a chin, dorsal, ball and tail turrets and two side turrets, the latter remotely controlled. Three-bladed propellers are used and the monster carries heavy armor. Such a craft would appear to have great tactical value in the Pacific, particularly against Japan's mainland and home installations, *viz* Tokyo! . . . Hawley Bowlus has developed the largest glider

(Turn to page 44)

First picture of the new Armstrong-Whitworth *Albermarle* Mk. 1, twin-engine monoplane of composite wood and metal construction. Two Bristol *Hercules* engines are used

New Lockheed P-38J *Lightning* is vastly improved version with new Allison engines

HI, FELLERS! WHO ELSE WANTS ONE OF THESE NEW X-CELL MINIATURE STORAGE BATTERIES? LINE FORMS RIGHT AT YOUR DEALER'S (OR THE P.O. FOR MAIL ORDERS). AND, BY THE WAY, OHONOTE WILL SOLVE YOUR BALSA PROBLEM AND TAKE A GANDER AT THESE SLEEK $1.95 SCALE MODELS, TOO.

Barney

30 in. PACIFIC ACE

Modelers, here's top value in a durable, practical commercial model that'll give you lots of fun building and flying. Yes, it's easy to build, because the plans are well drawn and complete down to the last detail. Kit has ample supply of first grade wood. Compares with and outflies many a dollar seller **35c**

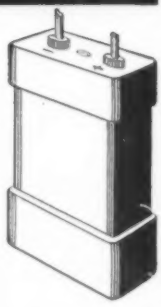
Plus 10c postage

New X-Cell Miniature

STORAGE BATTERIES

Modelers everywhere are going for these new X-Cells in a big way! And no wonder—for they give a hotter spark than the best flashlight cells—and they're *rechargeable* from an automobile storage battery! One charging takes care of a whole day's flying. Say "goodbye" to ignition trouble with *guaranteed* X-Cells.

FLIGHT BATTERY Wt. 1½ Oz. dry—2 Oz. fully charged. **$2.75** **BOOSTER BATTERY** **$3.75**



SCALE MODELS

$1.95

Add 15c Postage

CATALINA

BOEING B-17

CONSOLIDATED PBY

Enemy task force or sub—it makes no difference to this super-spotter long range flying patrol boat. Here's a built-up scale model that's a wonder. Scale ¼" to ft. ..... Add 15c postage **$1.95**

We will have **SYNTHETIC RUBBER** in stock by the time this ad appears.

FLYING FORTRESS

The glories of the Flying Fortress have been sung to sweeter tunes than I can write, but you never saw a sweeter model than this one! Has nearly 27" wingspan, and is faithful model of the latest type B-17. Built up scale— ¼" to ft. ..... Add 15c postage **$1.95**

THE JAP ZERO

The only reason I can think of for wanting to build a model of *anything* those buck-toothed, yellow bellied sub-humans have is to see how much better our planes are than theirs! Detailed ¾" flying type scale model..... **$1.95**

Add 15c postage

BELL AIRACOBRA

Packs a wallop that sends the Japanazis reeling! Sleek as a silver bullet—deadly as a hooded cobra. Detailed ¾" flying type scale model that'll fairly make your mouth water when you see it. Get your order in now..... Add 15c postage **$1.95**

Today's Sermon

By Barney

We hear a lot of griping these days about inconveniences the war has imposed on us. Well, cut it out! I say. We "ain't seen nothin' " compared to what's happening at the battle fronts! And you optimistic guys wearing rose-colored glasses who think the war's just about over—and we're set for green pastures—huh! What you'd better look at is them rose-colored 10c War Stamps and the green two-bit ones! And ya'd better look at a whale of a lot of 'em, too!

GATHER ROUND, MODEL BUGS, WHILE I TELL YOU SOME MORE ABOUT OHONOTE AND OTHER MATTERS. — Barney

OHONOTE!

Modelcraft

The Largest Supply House in the West

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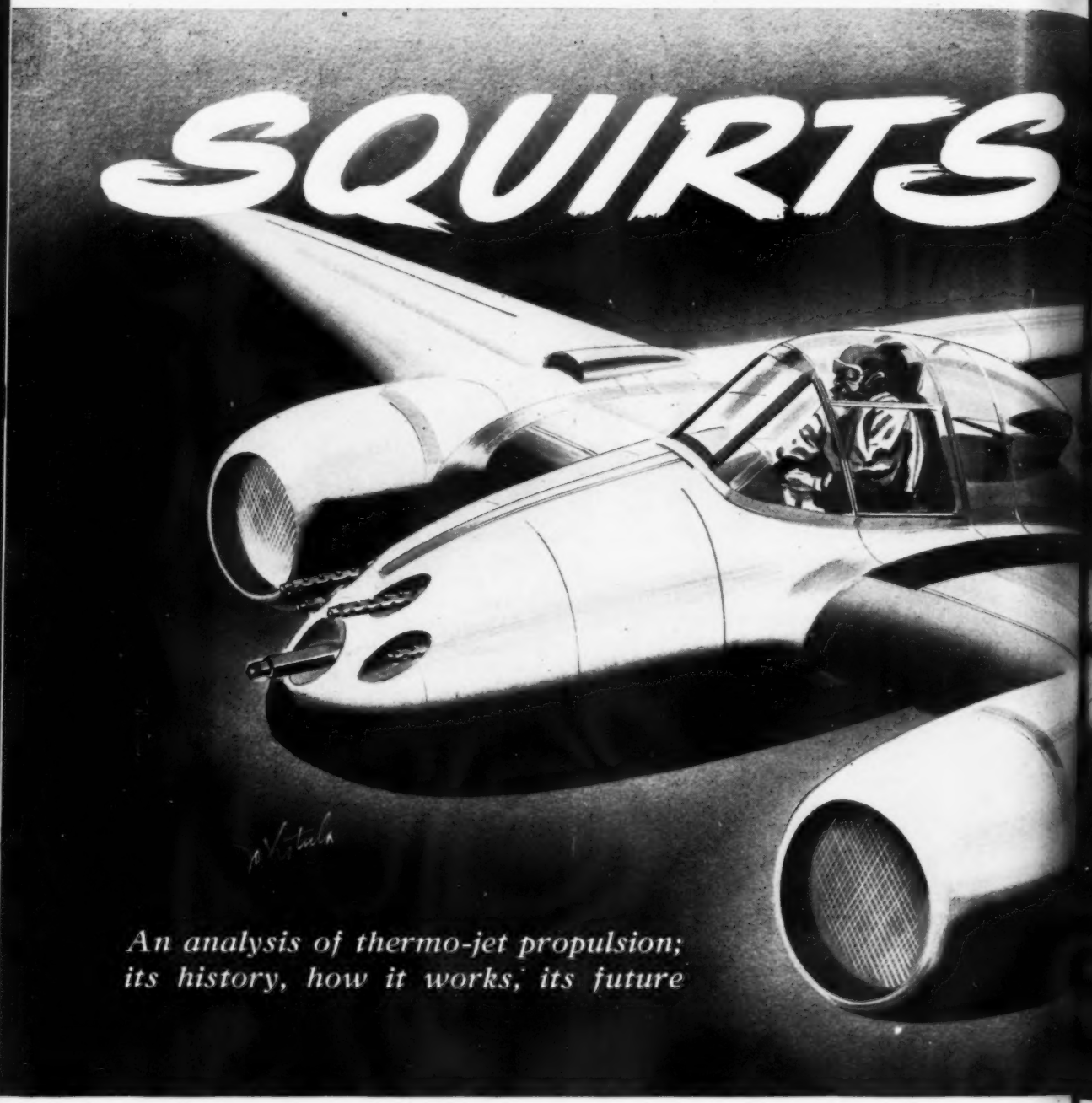
Just a word more about Ohonote, that new wood I got from Mexico to help you modelers keep on doing your stuff. If you haven't tried some, you ought to. It works up just about as easy as balsa, and it's a lot stronger. All Modelcraft kits are supplied with either balsa or Ohonote—or both. That's what we think of it! All sizes available for immediate delivery.

SQUIRTS



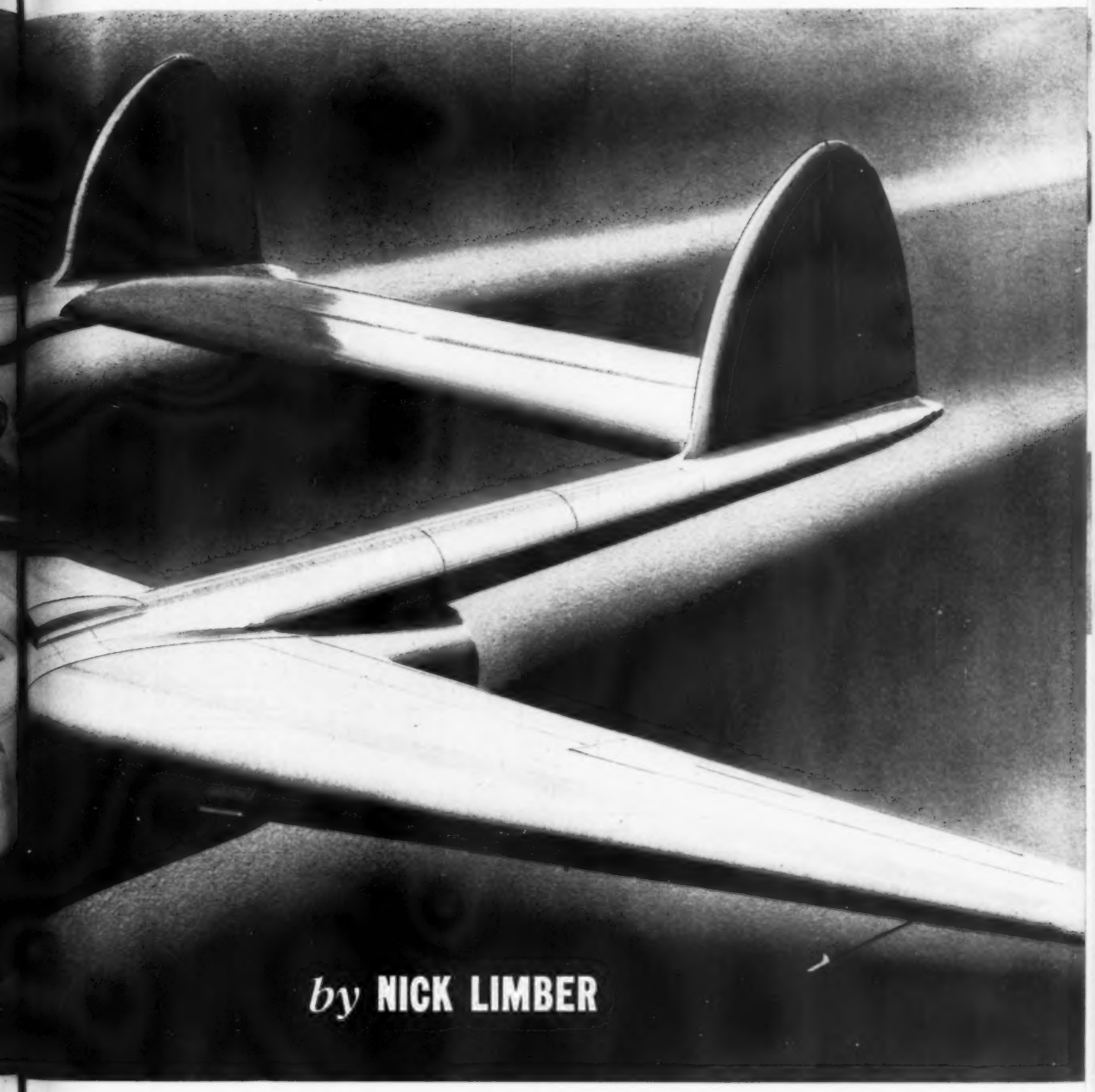
An analysis of thermo-jet propulsion; its history, how it works, its future

ELECTRIFYING, as the news out of Kitty Hawk after the Wright Brothers first flight, the newspaper stories of successful jet propelled airplanes have captivated the imagination of us all and have created an unparalleled impression that another scientific miracle has come to pass. Whether this impression can be attributed to the long line of successes associated with the airplane manufacturers or to a decade of various reports of rocket experimentation throughout the world is hard to say. However the impression does exist and the scientific facts all indicate that continued progress and expansion in this latest field of research is not unfounded. Analyzing available reports of previously published experiments and applying already known knowledge of the components contained in the publicized Jet-Propulsion plane, we find that the application of the thermal air jet unit is within the realm of present day engineering achievement and that the theory of jet propulsion is no longer an academic mystery.

Research in jet or rocket propulsion as it had been commonly known for many years, can be classified into three distinct catagories each applicable to a particular function in the present scheme of things.

The first, and oldest, application of the rocket propulsion principle consists merely of strapping powder rocket charges, similar to the pyrotechnic skyrocket, to an aircraft and igniting the charge at a predetermined moment imparting a momentary burst of force or thrust which permits a heavily loaded aircraft to take to the air without necessitating more powerful engines or from a much smaller runway. The earliest recorded data of experiments of this nature credits a German glider club and date back to 1928.

What practical conclusions these experiments rendered we cannot say. However, we do know that many of the German plane builders have during this war resorted to this means of launching overloaded aircraft into the air. It is now also believed that some similar scheme was being used to assist in catapulting the first Dornier flying boats off the deck of the Schwaben when the Reich was making its "bid" at establishing transoceanic airways many years prior to the



by **NICK LIMBER**

war. With refinements in the pyrotechnic trade, it is now within advantageous engineering scope to employ powder charges as the Germans do as a means of assisting takeoff. The limiting factors of this method are the short period of burning time, moderate thrust output, and complete lack of control of the apparatus once the charge has been ignited. Analyzing this method for the favorable factors we readily find that a light installation capable of being jettisoned is adequate for certain missions and if the German successes with this method can serve as a yardstick, we assume acceptable for use particularly on overloaded fighter and medium bombardment aircraft.

The second, and most publicized, school of rocket or jet propulsion is that which has advocated a liquid fuel rocket motor. This system varies from the powder charge method only inasmuch as a liquid combustible agent and liquefied oxygen are burned in lieu of powder. In principle both methods are the same inasmuch as both are dependent upon the oxidation of combustible agents, which must be carried with the installation, for the creation of a reactive force. The second method is superior to the first only insofar as much greater power, absolute control (the motor being capable on or off control) and longer operating time are possible.

There have been many experiments conducted in this country and abroad over a period of twenty odd years but there still exist many of the disadvantages and limitations that prevailed when this work first started. Among the greatest of these disadvantages, to the liquid fuel rocket motors, their foremost limitation in application to aircraft, has been an unbelievable high rate of fuel and liquid oxygen consumption. Wherein we are now accustomed to measuring consumption of aircraft engines in gallons per hour, rocket motor consumption is measured in gallons per second, thus necessitating tremendous stores of fuel for even the shortest feasible firing time and restricts the use of such units only to assisting takeoff.

Considered only as a takeoff assisting agent, the liquid fuel rocket motor presents a favorable solution to the present

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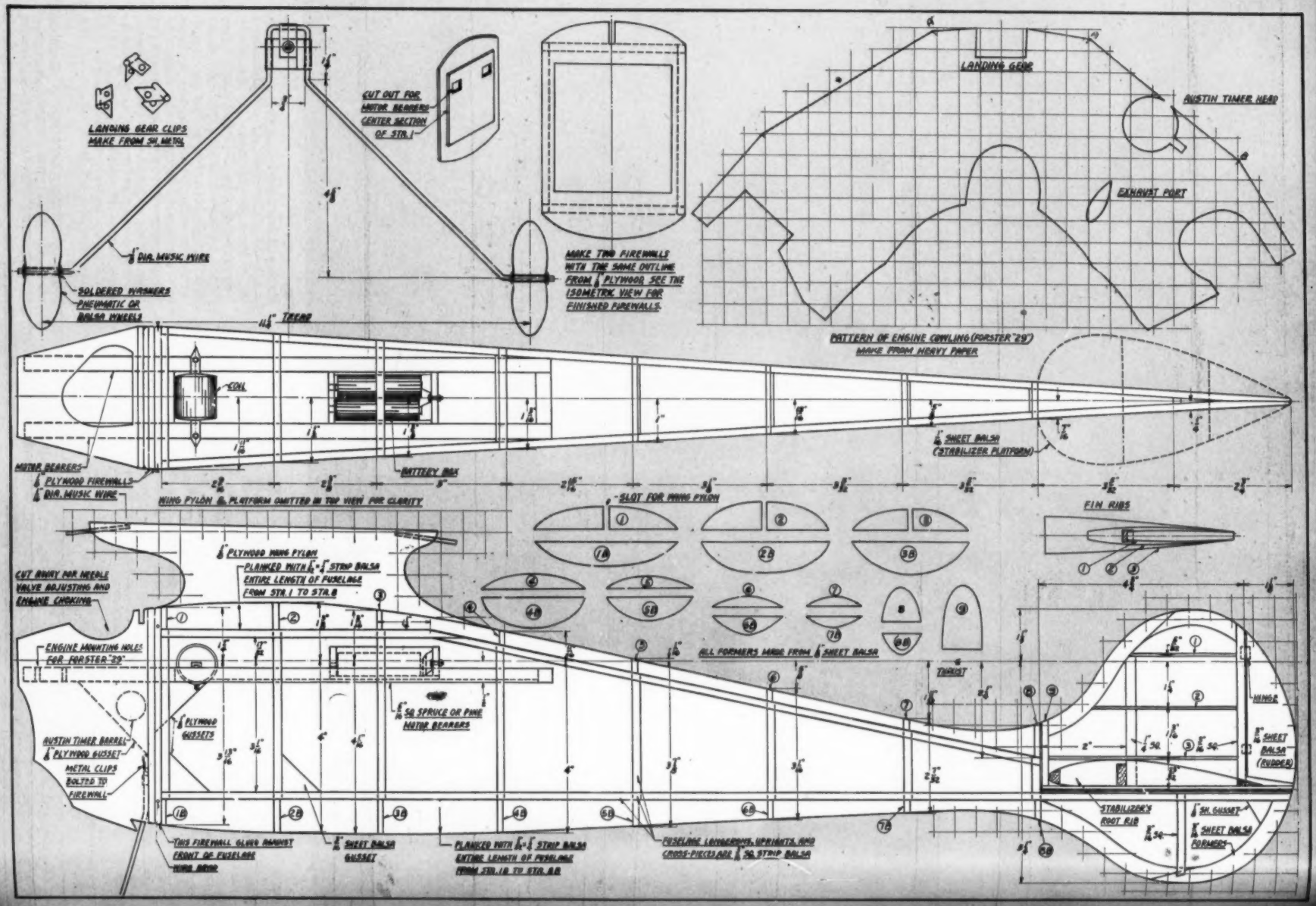

LANDING GEAR CLIPS MAKE FROM SH. METAL
CUT OUT FOR MOTOR BEARERS CENTER SECTION OF STR. I
MAKE TWO FIREWALLS WITH THE SAME OUTLINE FROM PLYWOOD SEE THE ISOMETRIC VIEW FOR FINISHED FIREWALLS.
LANDING GEAR
AUSTIN TIMER HEAD
EXHAUST PORT
DIA. MUSIC WIRE
SOLDERED WASHERS
PNEUMATIC OR BALSA WHEELS
TREAD
PATTERN OF ENGINE COWLING (FORSTER '29) MAKE FROM HEAVY PAPER
COIL
SHEET BALSA (STABILIZER PLATFORM)
MOTOR BEARERS
PLYWOOD FIREWALLS
DIA. MUSIC WIRE
BATTERY BOX
WING PYLON & PLATFORM OMITTED IN TOP VIEW FOR CLARITY
SLOT FOR WING PYLON
FIN RIBS
PLYWOOD WING PYLON
PLANKED WITH STRIP BALSA ENTIRE LENGTH OF FUSELAGE FROM STR. I TO STR. 8
CUT AWAY FOR NEEDLE VALVE ADJUSTING AND ENGINE CHOKING
ENGINE MOUNTING HOLES FOR FORSTER '29
ALL FORMERS MADE FROM SHEET BALSA
THRUST
PLYWOOD GUSSETS
SQ. SPRUCE OR PINE MOTOR BEARERS
AUSTIN TIMER BARREL
PLYWOOD GUSSET
METAL CLIPS BOLTED TO FIREWALL
HINGE
SHEET BALSA (RUDDER)
STABILIZER'S ROOT RIB
SH. GUSSET
SHEET BALSA FORMERS
THIS FIREWALL GIVES RADIUS FRONT OF FUSELAGE
SHEET BALSA GUSSET
PLANKED WITH STRIP BALSA ENTIRE LENGTH OF FUSELAGE FROM STR. 1A TO STR. 8B
FUSELAGE LONGERONS, UPRIGHTS, AND CROSS-PIECES ARE SQ. STRIP BALSA

AIR AGER

A super-strong, super-fast climbing gas model

by

FRANCIS P. CONANT

THE Air Ager is very conventional in design, and incorporates in her force set-up factors necessary for a very steep climb. Super-strong construction, that is so essential but largely neglected by designers of fast climbing gas models, is featured.

Fuselage

The body is constructed of 3/16" sq. balsa strips. After building the first side, leave it on the plans and build the second half, or side, right over it to insure uniformity. Use plenty of cement particularly around and in the splices of the longerons. When the sides are dry, remove them and check to see that they are exactly alike. Put a thin coat of glue on all the exterior surface of the butt joints between the fuselage uprights and the longerons. When this coating has dried, glue the ends of the fuselage halves together, and insert the cross-pieces at the top and bottom of the front of the fuselage sides. Insert the rest of the cross-pieces, and make sure that they are the exact lengths given on the plans. Work towards the tail of the fuselage. When all the cross-pieces have been glued in place, check their joints and apply additional glue where needed. Cut the formers out of 1/8" sheet balsa, using the patterns given in the plans. Glue these formers onto the top and bottom of the fuselage, and make certain they are at the correct angle to the longerons. Make the stabilizer platform from 1/16" sheet balsa and the lower fin formers from 1/8" sheet balsa, and attach to the fuselage in the positions indicated on the plans. Make the wing pylon from 1/8" plywood, and cut to the shape shown on the plans with either a coping or jig saw. Drill 1/16" holes where indicated on the plans, at an upward angle in the leading and trailing edge of the pylon, to depth of about one inch. Insert 1/16" diameter music wire into the holes, and cut off so that a half an inch projects from the pylon. Fill the holes with glue, coat the 1-1/2" pieces of wire with glue, and press into the holes. Collect the glue that will ooze out, and pat around the top of the wire and the edge of the pylon. Round off the edges, and attach the pylon to the fuselage, but make sure that it is perpendicular to the cross-pieces, and that it fits snugly in the former slots. Now plank the top and bottom of the fuselage with either 1/4" by 1/16" or 1/4" by 1/32" strip balsa. Start from each side of the pylon and work outwards to the fuselage sides. If care is taken in planking around the stabilizer fairing on the top of the fuselage, a very smooth and realistic job can be done. Only plank up to the last former on the bottom of the fuselage, as the lower fin is covered with 1/16" sheet balsa. When the planking is finished, install the gussets where indicated in the plans. Finally insert 1/16" sheet between the first two uprights on both sides of the fuselage.

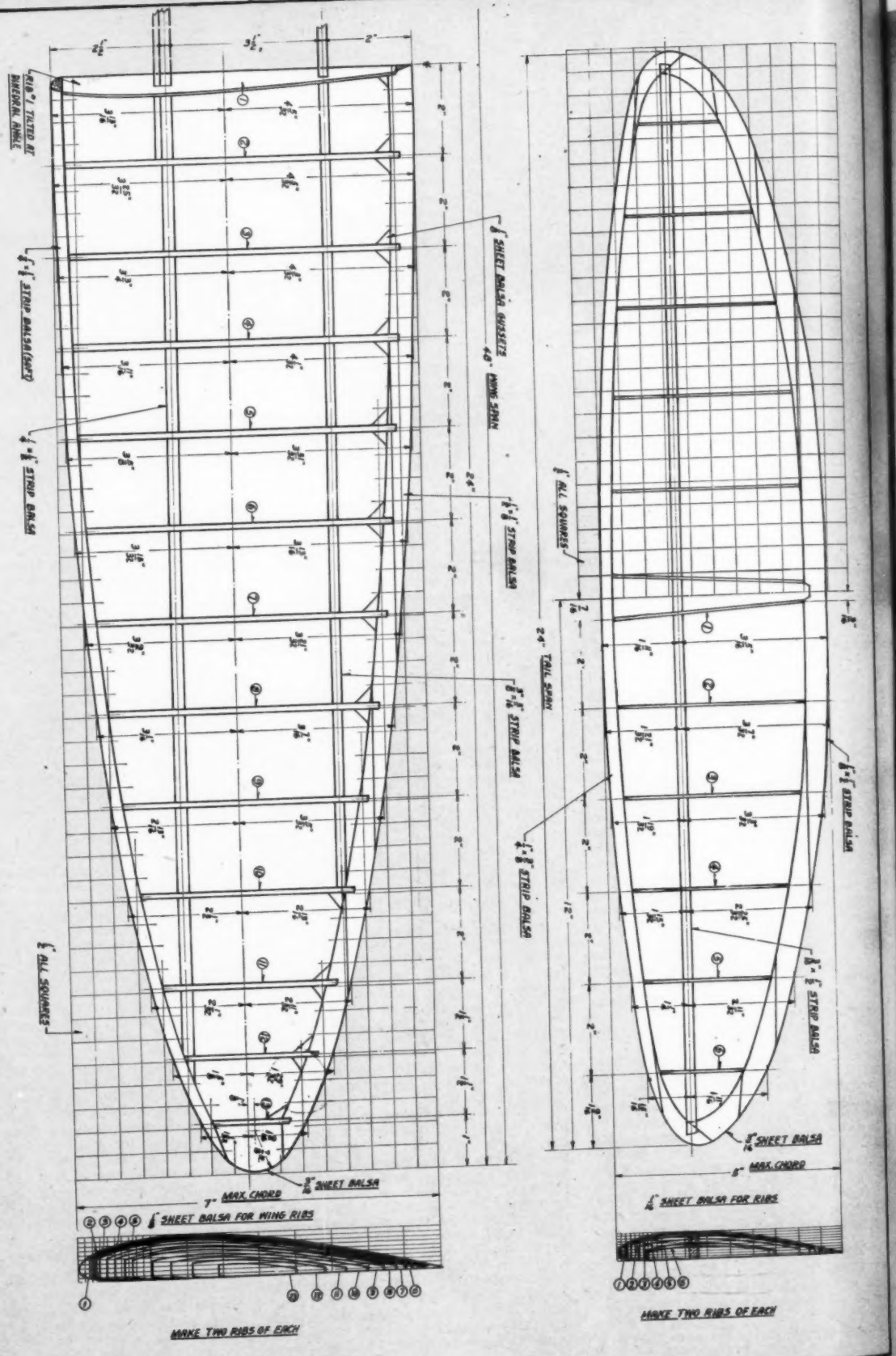
Motor and Ignition

Cut the motor bearers from 5/16" sq. spruce or basswood. Find the correct length from the plans. Cut two firewalls from 1/8" plywood, and from one cut out an area the same size and shape as shown on the plans, with a jig or coping saw. Now on the other firewall, glue 1/8" sq. strips of balsa in such a way that when the two firewalls are pressed together, they will be "keyed" to each other. Solidly glue the firewall with the rectangle cut out of it against the first uprights and cross-pieces and formers, so that its outline conforms with the front of the fuselage. Now locate on the other firewall the position of the motor bearers, and openings for them, 5/16" sq., to pass through. Four small nails should be hammered into the side of the firewall glued against the fuselage, two to each side, placed at the top and bottom. When the motor unit is to be installed, rubber bands can be hooked onto the nails, and then wrapped back and forth across the top and bottom of the removable firewall. The distance between the bearers and the amount they project beyond the removable firewall is suitable for a Forster 29 engine, but the bearers can be altered to fit any other Class "B" or small Class "C" engines. Force the bearers through the firewall holes, glue, and add all necessary gussets (from 1/8" pine sheet). These will vary slightly if a different engine is used and on the position of the timer. When the bearers have dried, drill the holes for the engine bolts. It is very convenient to have the timer mounted underneath the motor bearers and next to the firewall. To do this, make one of the exterior gussets with a hole in it of the same diameter as the barrel of the Austin timer. This will not weaken the gusset materially. The design of the "Air Ager" calls for an inverted motor, which, aside from lowering the center of gravity and raising the thrust line, adds quite considerably to the looks of the plane when the cowling is installed. Drill holes through the firewall for the passage of ignition wires and landing gear bolts. The booster batteries hook up to a motor bolt which is grounded and is minus (—), and to the landing gear which is connected to the primary terminal of the ignition coil which is plus (+). The negative lead from the pen cells is taken to the Austin timer through the firewall, from the other side of the timer to an engine bolt. It is convenient to mount on this bolt the grounded terminal of a metal condenser. This insures a good connection, and makes the engine completely removably in a matter of seconds, if the other terminal (+) of the condenser and plus lead from the coil have lugs on their ends which can be quickly attached or detached to the insulated bolt on the timer housing (this arrangement is true for many of the "B" motors—Forsters, Ohlssons, etc.). After the model has been test-flown, and the correct adjustments made, a cowling cut from heavy paper and doped on the outside will greatly enhance the looks of the model.

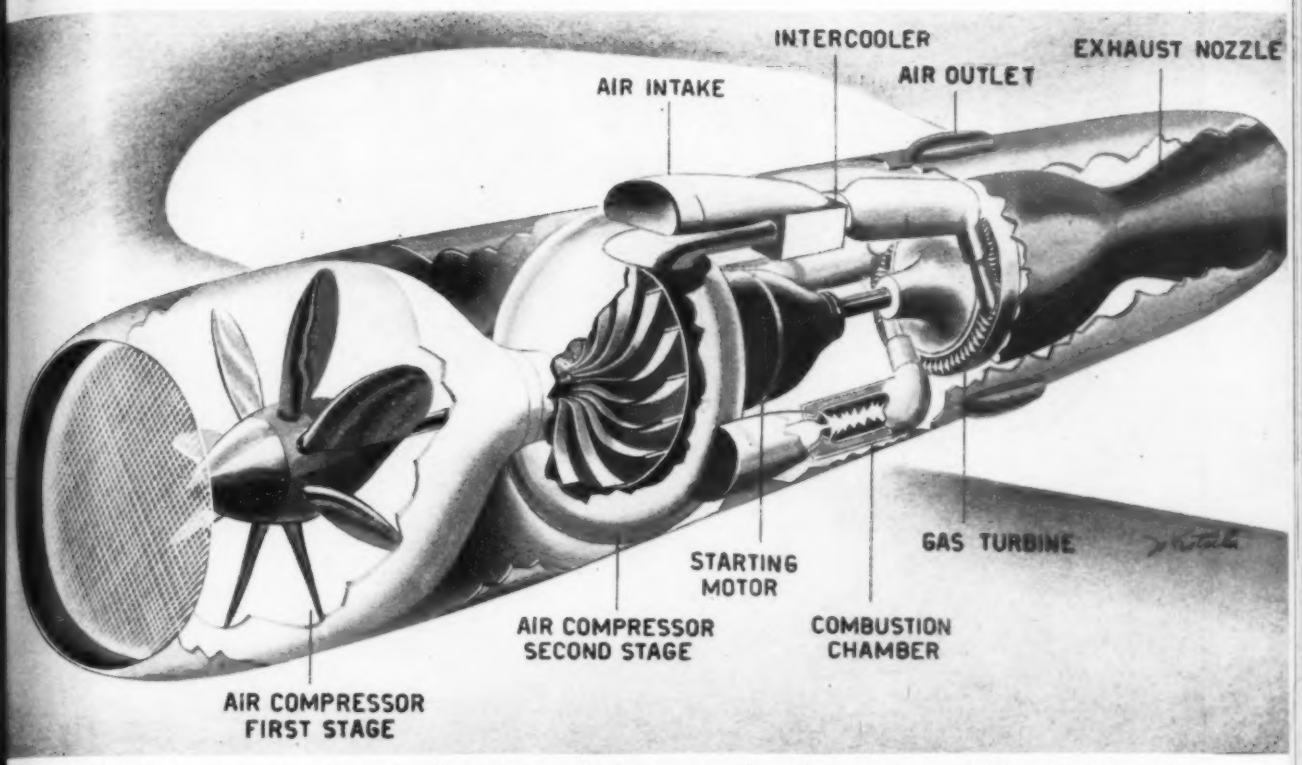
Wing and Platform

The wing platform of the Air Ager is an ellipse. The major axis of the ellipse bisects the minor axis, or chord of the wing, and for this reason only one panel of the wing is drawn on the plans. To

(Continued on page 60)



INSTRUCTIONS FOR BUILDING THE RUBBER-BAND WING PANEL ARE GIVEN IN THE WRITTEN ARTICLE



Air is taken in at ram pressure and compressed in two stages, although more may be used. Intercoolers cool air heated by compression, thereby preventing pre-ignition. Several small combustion chambers insure higher efficiency. Electric starter motor run from battery. Air outlets reduce chamber pressure, assist in cooling combustion chambers

Squirts

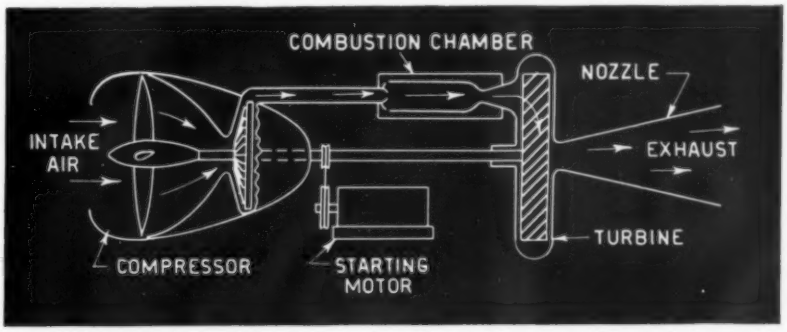
(Continued from page 7)

problem of launching overloaded aircraft of the heavy bomber or flying boat type and can be used as such to immediate advantage. The power output of such units, based on results made public prior to the war, are comparable to an aircraft engine rated between 1,000 and 2,000 hp. and would represent a far lighter and inexpensive installation. Inasmuch as the firing time depends only upon the fuel carried and there is absolute control of operations at all times, this horsepower is made available to the pilot when, as, and if wanted. Such an installation permits a far greater operating range or payload capacity for existing aircraft and its merits are undoubtedly under investigation.

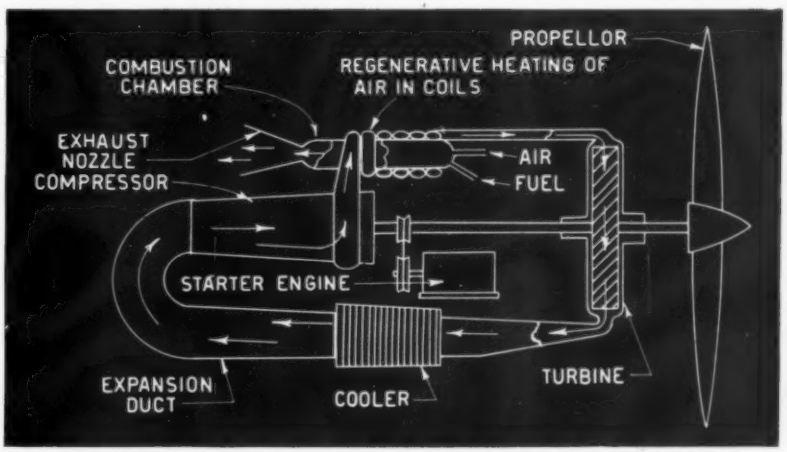
The third and by far the most adaptable installation to date, is the Thermal-Air Jet motor recently publicized in the Bell airplane. The thermal jet type of motor varies considerably from the forementioned units as we soon shall see. Its design is such as to permit or sustain an aircraft in flight for long periods of time and function efficiently in place of the propeller and the present type of reciprocating engine.

Basically, this type of unit is arranged to continuously draw large quantities of air from the atmosphere, compress it, pass it through a combustion chamber in which a small quantity of fuel is burned with it, and then allow the mass of hot gasses to escape through a nozzle as in the liquid fuel rocket motors. The force created by the escaping gasses reacts in the form of thrust as in the two previous cases. Inasmuch as the basic formula for

(Turn to page 27)



Schematic layout of open-cycle constant pressure gas turbine system (Thermal-air jet unit)

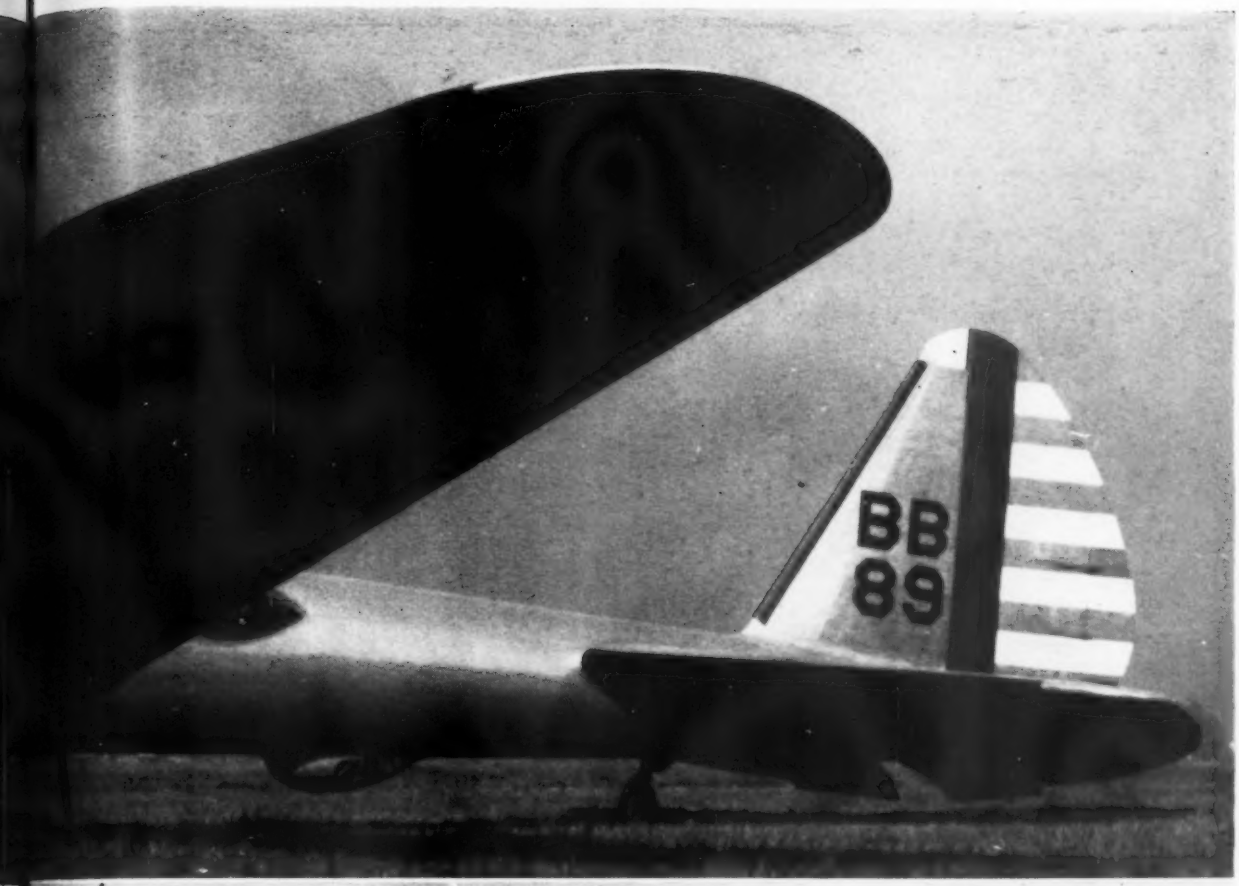


Schematic layout of closed-cycle constant pressure gas turbine system (Turbo-jet unit)

AIR AGE FRONTIERS

Boeing *Super Fortress* XB-15 was flying test lab for new B-29. Developed in 1938, it has span of 150 ft., length of 90 ft. and is 18 ft. high. Four P&W *Twin Wasp* SC-G develop 1050 hp. ea. Weighing 67,200 lbs., it flew 3,000 mi. non-stop with 15 ton load, World Record.

Hawker *Typhoon* IB from ¾ rear shows canted center section. Napier *Sabre* engine develops 2400 hp., most powerful in service. Four 20 mm. cannon are carried and speed well over 400 mph. (See pg. 63). Now four years old, *Typhoon* may soon be replaced by newer models.



Curtiss SOC-3 leaps from cruiser catapult

Famed Grumman TBF *Avenger* is now in action with the British Fleet Air Arm where it has been known as the *Tarpon* I. Name may shortly be changed to *Avenger* I, however, for simplification of designation between British and American planes. Three man crew includes pilot, gunner-radio operator and lower gunner.

It's a wartime Silver Fleet now as this unpainted Boeing B-17G *Flying Fortress*, first to leave for action, shows. Paint removal saves 60 pounds and increases speed. All combat planes now unpainted.

Die Luftwaffe

Still in use! Recent reports from the crumbling Nazi front in Russia show the Germans are pressing the obsolescent Henschel Hs. 123 (above) and the Focke-Wulf Fw. 189 into service as ground cooperation machines. The Henschel dive-bomber has a top speed of 253 mph., the Focke-Wulf only 220 mph. Badly out-dated, both show Nazi desperation

First photo of actual Messerschmitt Me. 210 A1 shows remote-control barbette gun implacements on fuselage side clearly. Known as the *Recce*, it has proved a dangerous foe with two 20 mm cannon, four 7.9 mm machine-guns in nose and rocket guns under wings

Авиационная Сила

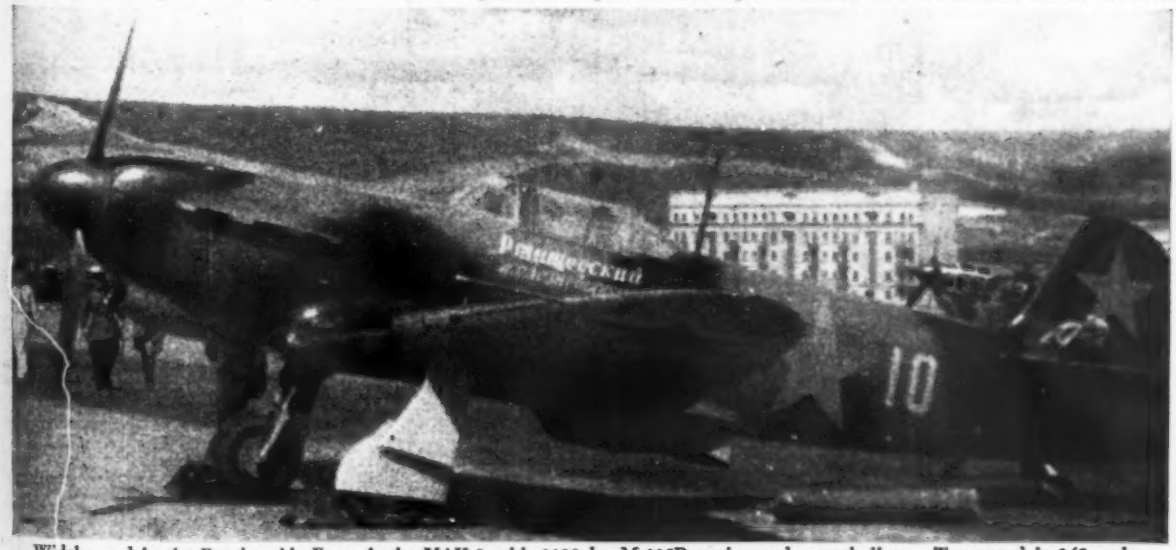
The TB-7 is standard heavy bomber of Russian Air Force. Four 1300 hp AM-38 engines. Crew: 11, Weight: 25 tons, 280 mph.

Tail turret in TB-7 houses movable 20 mm. belt-fed shell gun, in special enclosure.

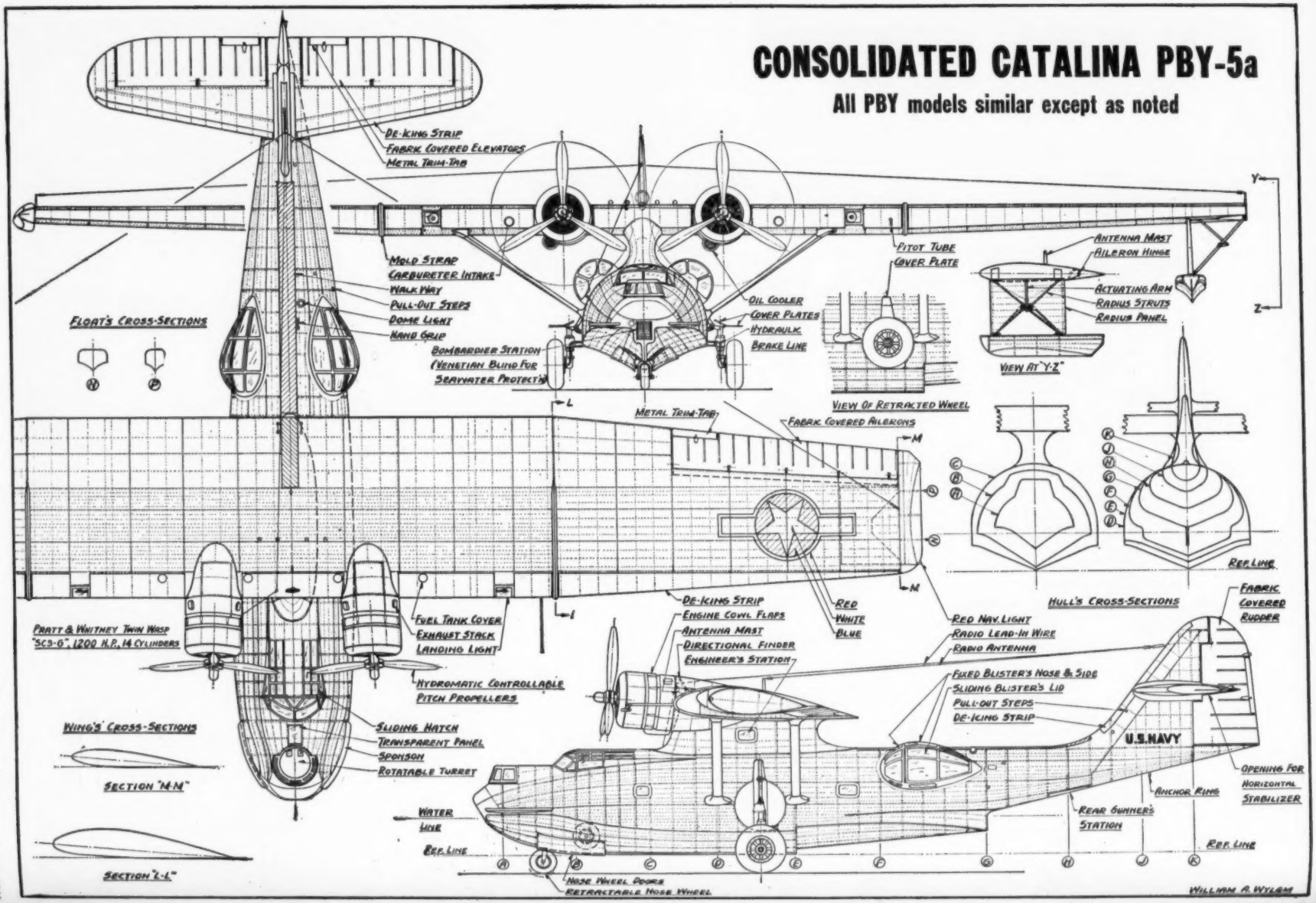
Amazing photo of the IL-2 *Stormovik* firing its battery of rocket guns, eight in all. In addition, mounts two 32 mm. cannon and four machine-guns. Top speed 280 mph.

Latest Soviet fighter in action is the LAGG-5, radial engine, 1600 hp. Top: 370

Standard fighter is the YAK-1, designed by Alex. Yakovlev. Powered by 1100 hp M-105P engine, it is capable of 335 mph. Armament includes 32 mm. cannon in nose.



Widely used in the Russian Air Force is the YAK-9 with 1100 hp M-105P engine and smooth lines. Top speed is 345 mph.


CONSOLIDATED CATALINA PBY-5a
All PBY models similar except as noted
De-Icing Strip
Fabric Covered Elevators
Metal Trim-Tab
Mold Strap
Carbureter Intake
Walk Way
Pull-Out Steps
Dome Light
Hand Grip
Bombardier Station (Venetian Blind For Seawater Protect'n)
Pitot Tube Cover Plate
Oil Cooler Cover Plates
Hydraulic Brake Line
Antenna Mast
Aileron Hinge
Actuating Arm
Radius Struts
Radius Panel
View At "Y-Z"
View Of Retracted Wheel
Float's Cross-Sections
Metal Trim-Tab
Fabric Covered Ailerons
Hull's Cross-Sections
Ref Line
Pratt & Whitney Twin Wasp "SC3-G", 1200 H.P., 14 Cylinders
Fuel Tank Cover
Exhaust Stack
Landing Light
Hydromatic Controllable Pitch Propellers
De-Icing Strip
Engine Cowl Flaps
Antenna Mast
Directional Finder
Engineer's Station
Red
White
Blue
Red Nav. Light
Radio Lead-In Wire
Radio Antenna
Fixed Blister's Nose & Side
Sliding Blister's Lid
Pull-Out Steps
De-Icing Strip
Fabric Covered Rudder
U.S.NAVY
Wing's Cross-Sections
Section "M-M"
Section "L-L"
Sliding Hatch
Transparent Panel
Sponson
Rotatable Turret
Water Line
Ref Line
Nose Wheel Doors
Retractable Nose Wheel
Anchor Ring
Rear Gunner's Station
Opening For Horizontal Stabilizer
Ref Line
William A. Wylam

The CAT

Plane on the Cover

IN EARLY 1942, when we still felt woefully surprised over what our enemies had sprung on us, reporters rushing to our outposts wired back, with mixed pain and indignation, that in comparison to Zeros our *Catalinas* were "sitting ducks." Patriots felt righteously indignant over the Navy's implied failure to be forehanded with some Zeros of its own. And for awhile it was a critic's holiday.

But the "sitting duck" has gone through the fire and emerged as the "phoenix" of the war. Today there is no plane so loved, so relied on, so wrapped in tradition as the Navy's *Catalina*. When, over a year after the war began, the Navy placed orders for building $30,000,000 more of the amphibian PBY-5a, the Cats had already become a part of American legend.

They were of course never meant to battle Zeros. The Zero was a land plane, even though the Japs did put floats on it for their Aleutian drive—a fast fighter dispensing even with armor for speed. The *Catalina*, carrying a heavy hull to permit landing on the sea, and bombs hung on its wings, was bound to seem slow by comparison. It was.

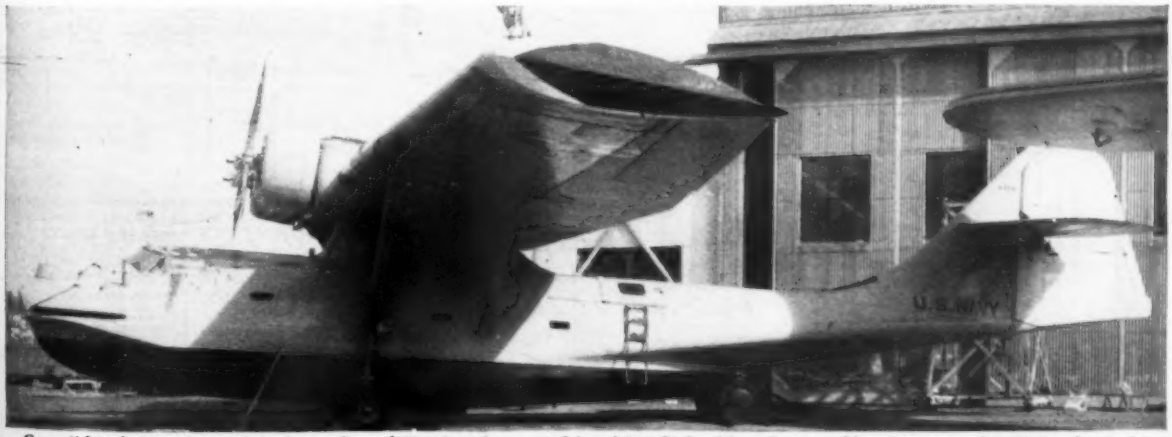
But . . . in those terrible fogs, winds and icy seas that the Japs relied on for protection while seizing their first American foothold, the Cats rose to kill.

Today we have evidence that the Japs probably meant to take Dutch Harbor. Had they succeeded, it might have entailed the ultimate loss of Alaska and even the whole West Coast. But they were turned back and landed at Kiska and Attu, with ultimate results that all know. The Cats didn't do it alone—but without the Cats our land planes might never have found the Jap fleet in those clouded seas.

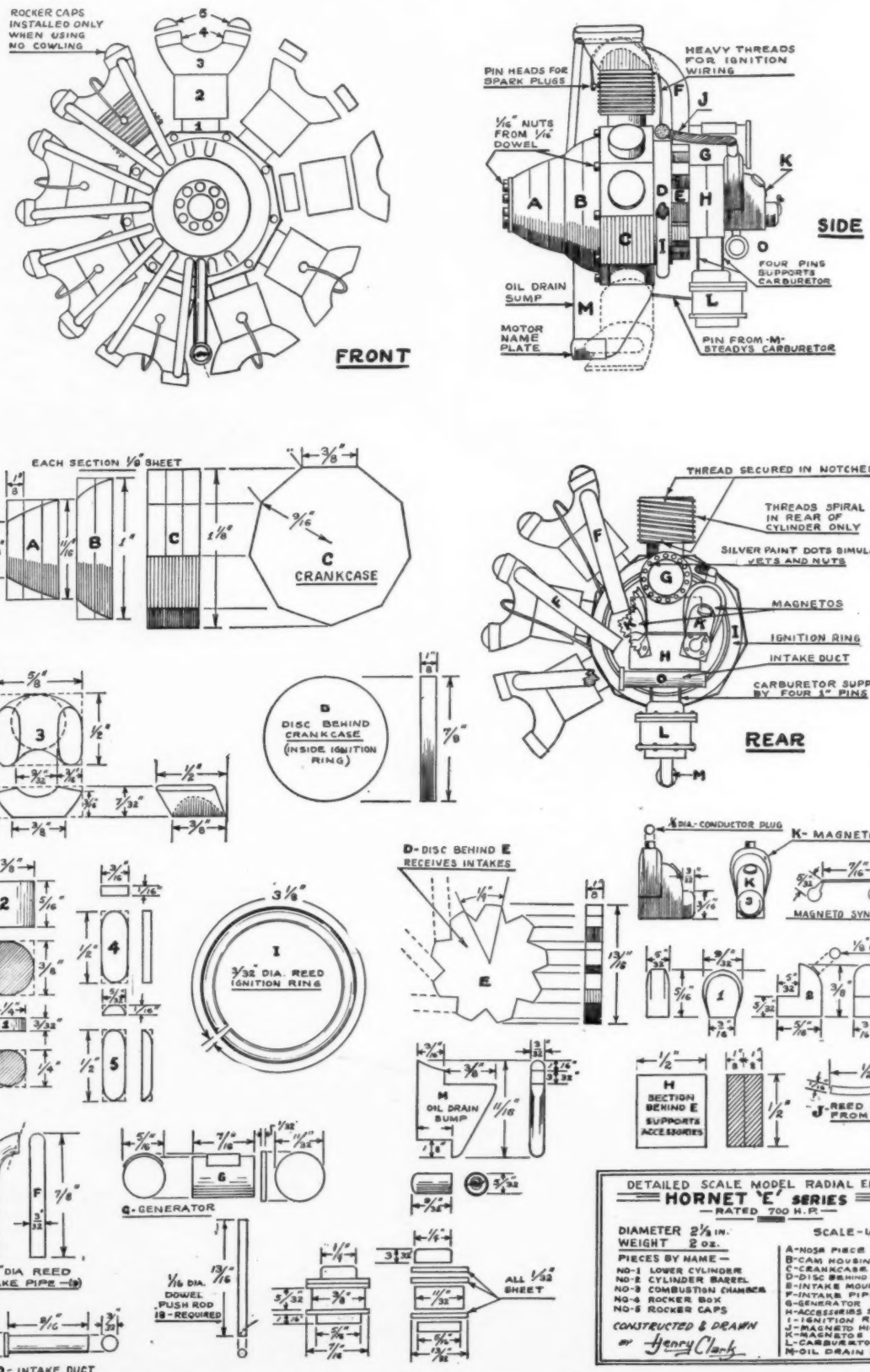
When a Navy tender first sighted the Jap's approach to Dutch Harbor through the Aleutian mists, a *Catalina* squadron —spread out fanwise on watch over the island chain—made first contact with the invading ships. As fast as conditions permitted, the Cats rushed back to base to alter their armament from depth charges to torpedoes, then went out again looking for an aircraft carrier that had been spotted. It was all a grueling job—the base was only three weeks old, and every torpedo had to be loaded by hand. Nor were there ready victories at hand to cheer the men on. The Jap carrier was missed in the fogs, and four times Jap planes bombed Dutch Harbor. Then, on the fourth, the Cats led Army bombers through the fog toward two Jap carriers near Umnak, which were serving as the spearhead for an expeditionary force. The larger of the carriers, believed to be the *Ryujo*, was hit. It retired northward, where the second eventually joined her.

How the *Catalina* pilots returned time and again for refueling to their base with their planes riddled—how many kept going until their fuel was completely spent, knowing they would be forced down at sea but unwilling to break contact with the enemy—all that will be retold thousands of times before men forget this war.

(Turn to page 48)



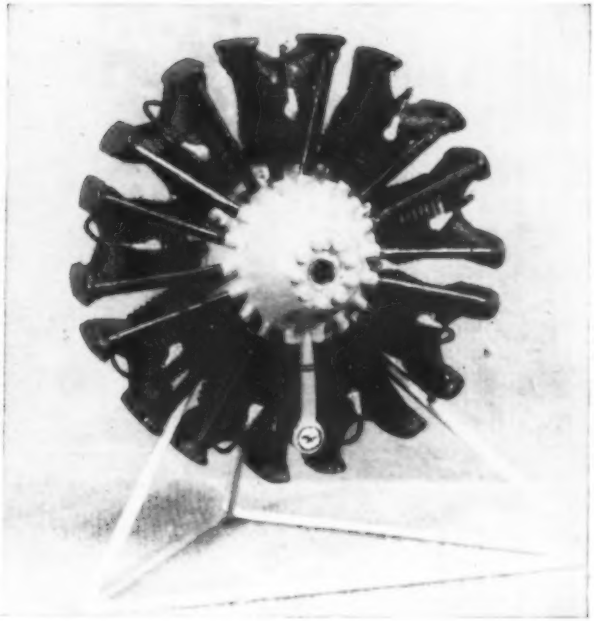
Consolidated XP3Y-1, original *Catalina,* following its record-breaking flight. Note large rudder. Latest models little changed


ROCKER CAPS INSTALLED ONLY WHEN USING NO COWLING
FRONT
PIN HEADS FOR SPARK PLUGS
HEAVY THREADS FOR IGNITION WIRING
1/16" NUTS FROM 1/16" DOWEL
FOUR PINS SUPPORTS CARBURETOR
OIL DRAIN SUMP
MOTOR NAME PLATE
PIN FROM "M" STEADYS CARBURETOR
SIDE
EACH SECTION 1/8" SHEET
CRANKCASE
D DISC BEHIND CRANKCASE (INSIDE IGNITION RING)
THREAD SECURED IN NOTCHES
THREADS SPIRAL IN REAR OF CYLINDER ONLY
SILVER PAINT DOTS SIMULATE VETS AND NUTS
MAGNETOS
IGNITION RING
INTAKE DUCT
CARBURETOR SUPPORTED BY FOUR 1" PINS
REAR
I 3/32" DIA. REED IGNITION RING
D-DISC BEHIND E RECEIVES INTAKES
K- MAGNETO
MAGNETO SYNCHRONIZER
1/8 DIA CAP
H SECTION BEHIND E SUPPORTS ACCESSORIES
J-REED CONDUCTOR FROM MAGNETOS
M OIL DRAIN SUMP
G-GENERATOR
3/32" DIA REED INTAKE PIPE
1/16 DIA. DOWEL PUSH ROD 18-REQUIRED
ALL 1/32" SHEET
Q- INTAKE DUCT
DETAILED SCALE MODEL RADIAL ENGINE
HORNET 'E' SERIES
RATED 700 H.P.
DIAMETER 2 1/8 IN.
WEIGHT 2 OZ.
SCALE-1/22"=1"
PIECES BY NAME—
NO-1 LOWER CYLINDER
NO-2 CYLINDER BARREL
NO-3 COMBUSTION CHAMBER
NO-4 ROCKER BOX
NO-5 ROCKER CAPS
A-NOSE PIECE
B-CAM HOUSING
C-CRANKCASE
D-DISC BEHIND CRANKCASE
E-INTAKE MOUNT DISC
F-INTAKE PIPES
G-GENERATOR
H-ACCESSORIES SUPPORT
I-IGNITION RING
J-MAGNETO HIGH TENSION
K-MAGNETOS
L-CARBURETOR
M-OIL DRAIN SUMP
CONSTRUCTED & DRAWN BY Henry Clark

SCALE MODEL RADIAL ENGINE

Details for a model Pratt & Whitney *Wasp* or *Hornet*

by **HENRY CLARK**



IF YOU'RE an enthusiastic model builder and have made scale models time and again, lining them up on your shelf alongside each other, you have at one time or another had the desire to "set forth" on a model that would really outshine all others in looks, detail and finish—in short, an extra special super detail job.

Of course, this model would have movable cockpit controls and a lavish set of instruments tacked onto the panel, along with numerous other gadgets to make it the perfect thing. So you engage in the endeavor. When you emerge several months later from the mess of chips, with a construction job worthy of the effort, you suddenly are confronted with the question of a motor for this superlative piece of work.

Here you've set out to complete your masterpiece, and are stumped for an engine with sufficient detail and appearance to do the model justice. You try to purchase one, but find that the market cannot possibly offer one such as you have visualized tacked onto the nose of this model. Of course it could be built, but what a colossal undertaking that'd be! But that's really a matter of opinion, and according to the ambition of the individual. If you possess that ability to turn out a model deserving of a good engine, then you possess the ability to build the engine we offer here—for just such a model.

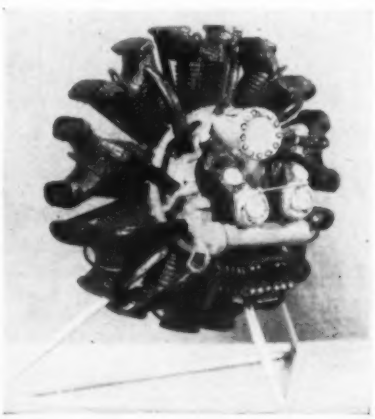
This motor is constructed basically of balsa, with reed and dowel bits here and there. Any wood of a harder surface may be used for a smoother finish, but balsa wood was used here to enable an easier and quicker job. To really set forth on it, secure some 1/8" sheet balsa, as this is put to use on the majority of parts.

Begin by cutting the main crankcase section, C, composed of 1/8" sheets cut to form shown. All other pieces are to be attached to this. The cylinders are then built, as this method of working affords a better system, working outwards from the center. These are begun by cutting out circular pieces, No. 1, from 3/32" sheet and cementing them onto the crankcase in positions shown.

Then the main cylinders, No. 2, are cut from square blocks of the sizes indicated and sanded round, grain running vertical to enable easier sanding. If 3/8" diameter dowel is available, this may be used instead; it eases the task of getting a good roundness. Now the thread that forms the cooling fins is wrapped in place, by inserting one end securely in the bottom end of the cylinder and winding it gently around the cylinder with about 1/32" spaces between the rows, and secured again in a notch at the top rim. In wrapping this thread, which incidently is of stout quality, make certain that the spiral motion of wrapping is confined to the rear of the cylinder, leaving the front strands straight around.

The combustion chamber, No. 3, is next carved to shape. The grain in this should run from front to back horizontally. This may appear difficult to carve at first, but an applied system of working will soon have them done. The correct angle should be determined on the top of this chamber for the proper rest of the rocker boxes. This is about 1/32" incline. The rocker boxes, No. 4, and rocker caps, No. 5, should be cut from 1/16" sheet, shaped as shown, then cemented in place evenly. If a cowl is employed no rocker caps are needed. This should complete the cylinder arrangement on the crankcase, and the engine is now ready for the cam and nose sections.

The cam section, B, is made from 1/8" sheet discs and sanded to the shape shown. The nose section, A, is formed in the same manner, and cemented up against the cam section. The grain on A and B should run in various directions to obtain a smooth roundness in the sanding process. The push rods are now cut to length from 1/16" dowel. The bottom ends should be slanted a bit to fit snugly onto the cam section, while a slight overhang of the rocker box is the mounting place for the top ends of these rods. The general front assembly is now complete.



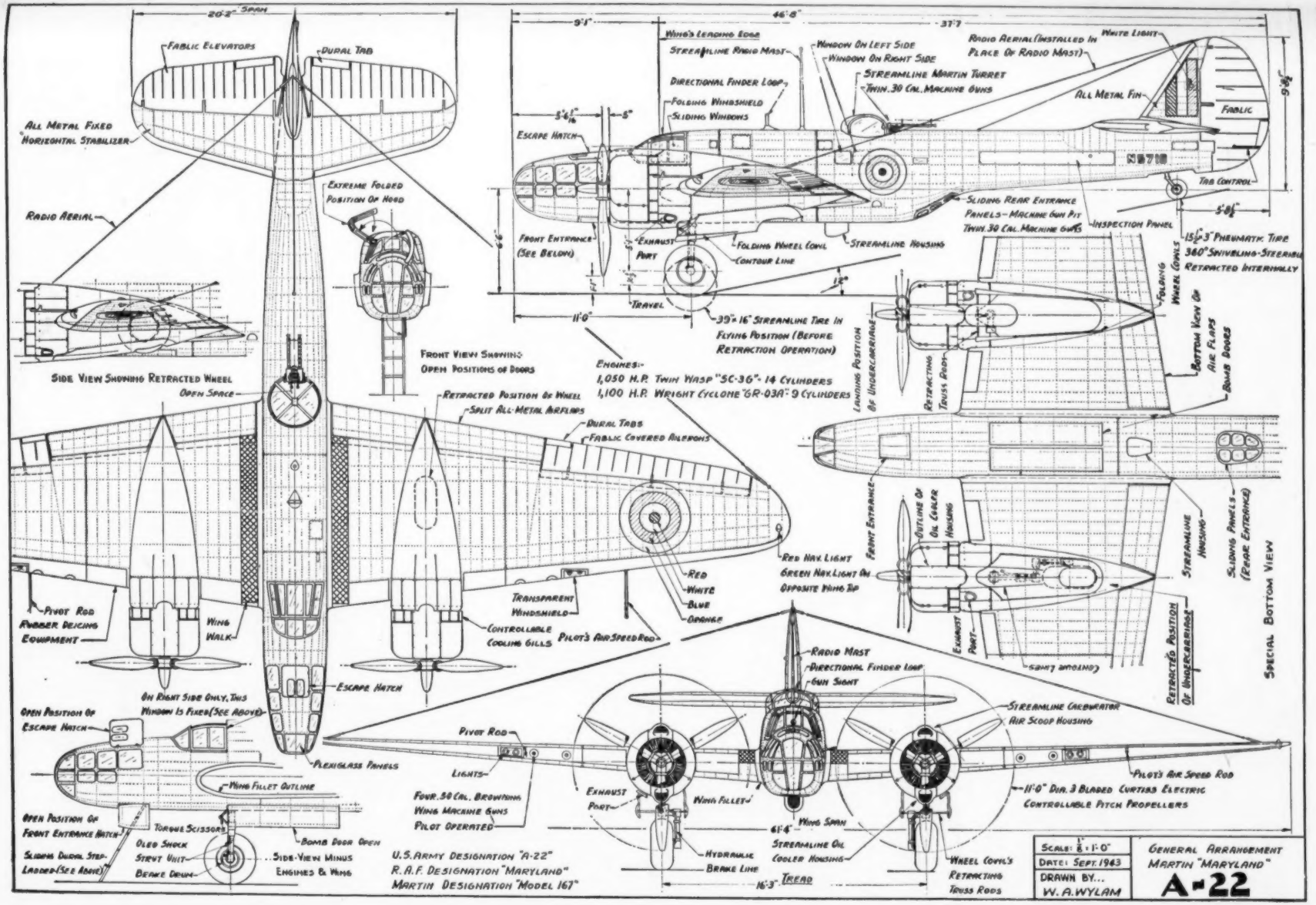
From 1/16" dowel, cut nine 1/16" length pieces for the nuts that are to be placed on the crankcase to simulate bolts for securing the crankcase. To set out on the rear of the engine the steps taken here will enable you to complete everything even before you've had a chance to consider it a hardship. First, disc D is cut from 1/8" sheet and sanded round. This is cemented right behind the crankcase, centered evenly. Disc E is a little difficult, therefore the nine notches should be laid out with dividers and marked off in pencil. Then with a sharp razor cut each notch as shown. These need not be perfect, as they will receive the intake pipes comfortably enough.

The ignition conducting ring, I, is now cut from a 3-1/8" length of 3/32" diameter reed. It is dipped into hot water and bent around a bottle to dry. The ends are then cemented together when dry, and the ring is placed over disc D and tacked here and there with cement. From this ring nine lengths of thread, heavy stuff, approximately 1-1/4" long each, should branch out, one end of each being secured to the ignition ring and travelling over the cylinder top, and secured to the pin head. One dot of cement will hold this end.

The intake pipes, F, are now cut from 3/32" diameter reed, each about 1-3/16" long. These are also wet in hot water and worked into a semi-circular position on one end. When dry, one end is set into its proper notch in disc D, and the curved end cemented to the right side of the combustion chamber in the rear.

The square section, H, is now made from two pieces of 1/8" sheet, 1/2" x 1/2" cemented together to form a large supporting area for the other accessories. This is cemented directly behind disc E, and centered. The generator, G, is now cut from a 5/16" square piece, 7/16" long, and sanded round. A saddle made from light cardboard is mounted on the

(Continued on page 42)


GENERAL ARRANGEMENT
MARTIN "MARYLAND"
A-22
SCALE: 1/8" = 1'-0"
DATE: SEPT. 1943
DRAWN BY... W. A. WYLAM
U.S. ARMY DESIGNATION "A-22"
R.A.F. DESIGNATION "MARYLAND"
MARTIN DESIGNATION "MODEL 167"
SPECIAL BOTTOM VIEW
SIDE VIEW SHOWING RETRACTED WHEEL
FRONT VIEW SHOWING OPEN POSITIONS OF DOORS
ENGINES:-
1,050 H.P. TWIN WASP "SC-36" - 14 CYLINDERS
1,100 H.P. WRIGHT CYCLONE "GR-03A" 9 CYLINDERS
FABLIC ELEVATORS
DURAL TAB
ALL METAL FIXED HORIZONTAL STABILIZER
RADIO AERIAL
EXTREME FOLDED POSITION OF HOOD
OPEN SPACE
RETRACTED POSITION OF WHEEL
SPLIT ALL-METAL AIRFLAPS
DURAL TABS
FABLIC COVERED AILERONS
PIVOT ROD RUBBER DEICING EQUIPMENT
WING WALK
TRANSPARENT WINDSHIELD
CONTROLLABLE COOLING GILLS
PILOT'S AIR SPEED ROD
RED
WHITE
BLUE
ORANGE
RED NAV. LIGHT
GREEN NAV. LIGHT ON OPPOSITE WING TIP
ESCAPE HATCH
ON RIGHT SIDE ONLY, THIS WINDOW IS FIXED (SEE ABOVE)
OPEN POSITION OF ESCAPE HATCH
PLEXIGLASS PANELS
WING FILLET OUTLINE
OPEN POSITION OF FRONT ENTRANCE HATCH
SLIDING DURAL STEP-LADDER (SEE ABOVE)
TORQUE SCISSORS
OLEO SHOCK STRUT UNIT
BRAKE DRUM
BOMB DOOR OPEN
SIDE-VIEW MINUS ENGINES & WING
WING'S LEADING EDGE
STREAMLINE RADIO MAST
DIRECTIONAL FINDER LOOP
FOLDING WINDSHIELD
SLIDING WINDOWS
WINDOW ON LEFT SIDE
WINDOW ON RIGHT SIDE
STREAMLINE MARTIN TURRET
TWIN .30 CAL. MACHINE GUNS
RADIO AERIAL (INSTALLED IN PLACE OF RADIO MAST)
WHITE LIGHT
ALL METAL FIN
FABLIC
ESCAPE HATCH
TAB CONTROL
SLIDING REAR ENTRANCE PANELS - MACHINE GUN PIT TWIN .30 CAL. MACHINE GUNS
INSPECTION PANEL
FRONT ENTRANCE (SEE BELOW)
EXHAUST PORT
FOLDING WHEEL COVER
CONTOUR LINE
STREAMLINE HOUSING
TRAVEL
39" - 16" STREAMLINE TIRE IN FLYING POSITION (BEFORE RETRACTION OPERATION)
15'-3" PNEUMATIC TIRE
360° SHIVELING-STEERING
RETRACTED INTERNALLY
LANDING POSITION OF UNDERCARRIAGE
RETRACTING TRUSS PIVOT
BOTTOM VIEW OF AIR FLAPS
BOMB DOORS
FRONT ENTRANCE
OUTLINE OF OIL COOLER HOUSING
STREAMLINE HOUSING
SLIDING PANELS (REAR ENTRANCE)
EXHAUST PORT
RETRACTED POSITION OF UNDERCARRIAGE
RADIO MAST
DIRECTIONAL FINDER LOOP
GUN SIGHT
STREAMLINE CARBURATOR AIR SCOOP HOUSING
PIVOT ROD
LIGHTS
FOUR .30 CAL. BROWNING WING MACHINE GUNS PILOT OPERATED
EXHAUST PORT
WING FILLET
PILOT'S AIR SPEED ROD
11'-0" DIA. 3 BLADED CURTISS ELECTRIC CONTROLLABLE PITCH PROPELLERS
WING SPAN
STREAMLINE OIL COOLER HOUSING
HYDRAULIC BRAKE LINE
TREAD
WHEEL COVERS RETRACTING TRUSS RODS

MARTIN *MARYLAND* A-22

by **WILLIAM A. WYLAM**

IT SEEMS only a little short of amazing that an exceedingly fine American military airplane could be almost unknown in the United States but this has been the fate of the Martin Model 167. It has played a vital role in this World War II and has been praised for its versatility and high performance abroad but very, very little concerning it has been made available to the American aviation fraternity. Perhaps what follows may explain.

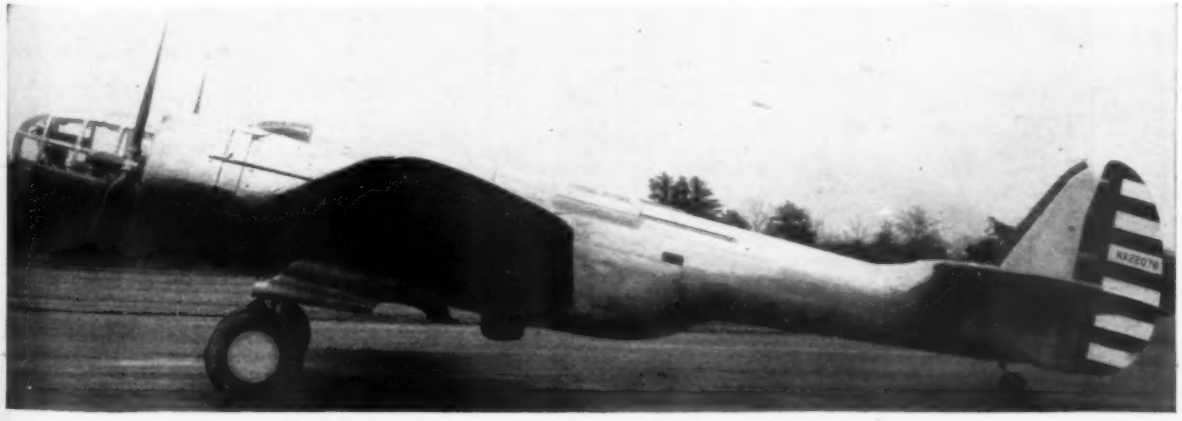
At the outbreak of World War II on September 4th, 1939, the French Air Ministry took hurried stock of the Armee de L'Air and found it in a dangerous state. This had resulted from two major errors in thinking: (1) The refusal to believe the oft-repeated news that Germany was re-arming in the air, and (2) The belief that the Luftwaffe was an invincible force, so huge in numbers, so capable in war, that no other nation had either the time, skill or courage to build an air force to oppose it. However, France had no alternative but to prepare, as hurriedly and as completely as time might permit, to oppose the Luftwaffe. With her own meager airplane building facilities overburdened, she turned to the United States and pleaded for planes. Contracts were signed for Curtiss *Mohawk* and *Tomahawk* fighters, Douglas DB-7 attack planes, North American NA-57 trainers and Martin 167 bombers. The latter contract was signed in February, 1939. Martin facilities near Baltimore, Maryland, were doubled in 77 days, the first 167 was flown 6 months later and in 10 months and 3 days the entire order for more than 100 bombers was completed. Two additional contracts were signed and were nearing completion when France fell on June 22nd, 1940.

Following this holocaust to their ally, the British Air Ministry, through the British Purchasing Commission in the United States, took over all French airplane contracts and immediately absorbed the undelivered airplanes into the Royal Air Force. The Martin 167 was thus put into service as the *Maryland Mk.* I. After completion of the original contracts, specifications were drawn up calling for an improved version known as the Martin Model 187 and to be known as the *Baltimore Mk.* I, and thus the end of production on the Model 167. However, *Marylands* were sent to the Royal Air Force contingents in the Middle East in preparation for the assault upon General Rommel and his *Afrika Korps*. On Oct. 25th, 1942 General Montgomery's artillery opened fire at El Alamein and the *Marylands* went into action. As bombers, fighters, reconnaissance and ground-attack machines they were in constant action and they flew wing-to-wing with *Hurricane* IIDs, *Hudson* Is, *Blenheim* IVs and *Beaufighter* IIs bombing and strafing the Germans through Tobruk, Benghasi, Tripoli and into Tunisia when the U. S. 12th Air Force took up the job which culminated on May 12th, 1943 when the enemy under General von Arnim on Cape Bon ceased all resistance.

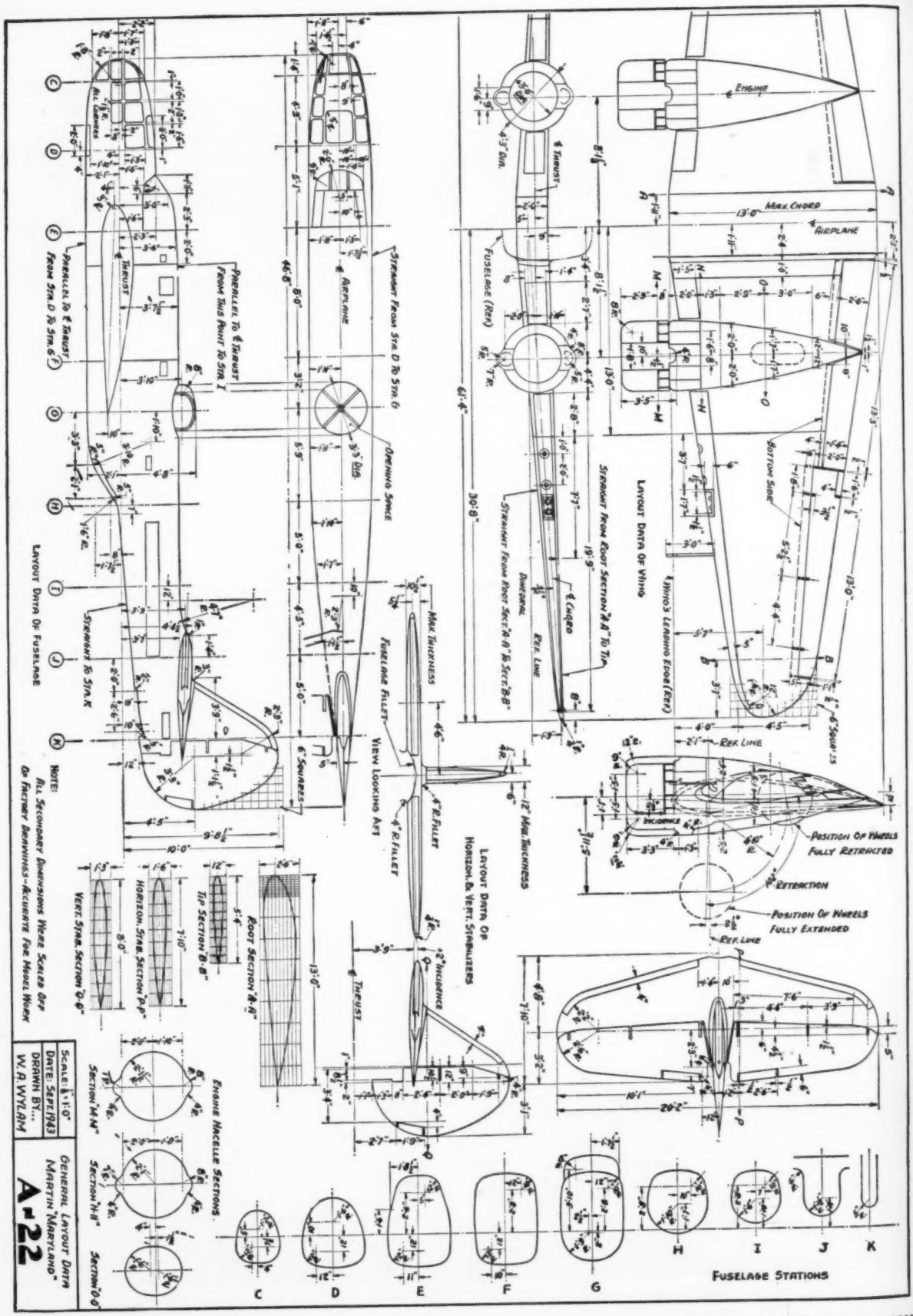
Certain Model 167s scheduled to be delivered to the French were absorbed into the U. S. Army Air Forces after the Fall of France.

After the Fall of France certain Model 167s scheduled to be delivered to the French were absorbed into the Army Air Forces where they became known as A-22s. Used largely as ground-attack advanced training machines, it was not believed to have seen action with the U. S. Army Air Forces.

The Model 167 is a three-place attack-bomber monoplane powered by two radial, air-cooled engines and equipped to carry a large variety of bombs, cameras, ammunition and armament. The original version delivered to the French Armee de L'Air is powered by two Wright *Cyclone* GR-1820-205B engines developing 950 horsepower each. The *Maryland* I used by the British is powered by two Pratt & Whitney *Twin Wasp* R-1830-SC3G engines developing 1,050 horsepower each. The A-22 is the latter



Here is the original experimental version, known as the A-22, submitted and accepted for use in the Army Air Forces in March, 1939


GENERAL LAYOUT DATA
MARTIN MARYLAND
A-22
SCALE: 1/4" = 1'-0"
DATE: SEPT. 1943
DRAWN BY... W. A. WYLAM
LAYOUT DATA OF FUSELAGE
LAYOUT DATA OF WING
LAYOUT DATA OF HORIZON. & VERT. STABILIZERS
ENGINE
AIRPLANE
MAX. CHORD
FUSELAGE (REF.)
THRUST
STRAIGHT FROM STA. D TO STA. G
PARALLEL TO ℄ THRUST FROM THIS POINT TO STA. I
PARALLEL TO ℄ THRUST FROM STA. D TO STA. F
STRAIGHT TO STA. K
OPENING SPACE
STRAIGHT FROM ROOT SECTION "A-A" TO TIP
STRAIGHT FROM ROOT SECT. "A-A" TO SECT. "B-B"
DIHEDRAL
REF. LINE
CHORD
WING'S LEADING EDGE (REF.)
BOTTOM SIDE
6" SQUARES
MAX. THICKNESS
FUSELAGE FILLET
VIEW LOOKING AFT
4"R. FILLET
12" MAX. THICKNESS
INCIDENCE
POSITION OF WHEELS FULLY RETRACTED
RETRACTION
POSITION OF WHEELS FULLY EXTENDED
VERT. STAB. SECTION "C-C"
HORIZON. STAB. SECTION "D-D"
TIP SECTION "B-B"
ROOT SECTION "A-A"
ENGINE NACELLE SECTIONS
SECTION "M-M"
SECTION "N-N"
SECTION "O-O"
FUSELAGE STATIONS
C
D
E
F
G
H
I
J
K
NOTE: ALL SECONDARY DIMENSIONS WERE SCALED OFF OF FACTORY DRAWINGS—ACCURATE FOR MODEL WORK

This three-quarter front view shows clearly the compact fuselage design and cowling details of the A-22's Pratt & Whitney engines

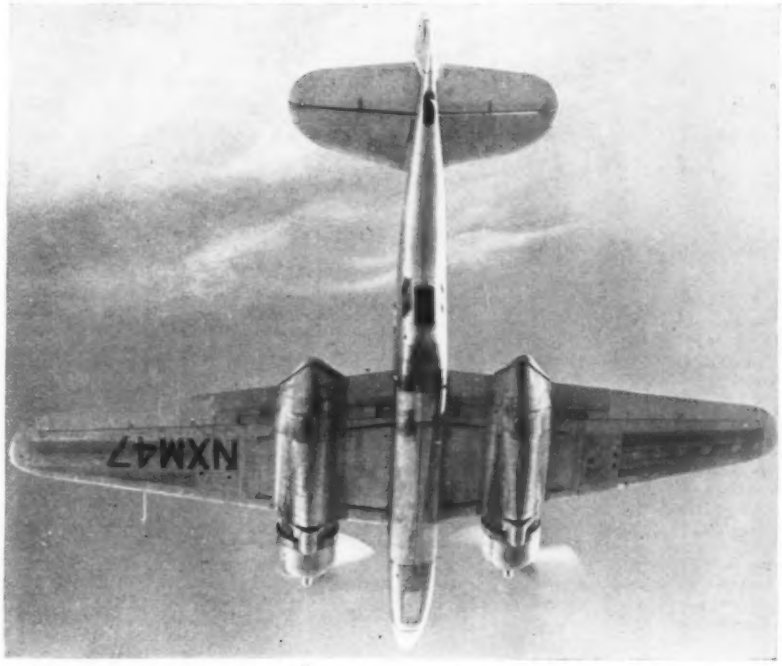
version.

The wing span is 61 feet 4 inches, length is 46 feet 8 inches and height is 10 feet. The wing area is 538.5 square feet. Fuel in the amount of 255 gallons is carried which, of course, is increased for long-range reconnaissance work. A total of 2,121 pounds of bombs and armament is carried and the *Maryland* I has a gross weight of 15,297 pounds. A permissable over-load of 16,571 pounds is permitted under reduced maneuvers. These figures give the *Maryland* I (and A-22) a wing loading of 28.4 pounds per square inch and a power loading of 8.5 pounds per brake horsepower.

Performance figures vary for various combinations of loading and tactical equipment but the standard attack-bomber version has a top speed of 304 miles per hour at 13,000 feet, making it one of the fastest of its type.

The Model 167 is an extremely flexible type, particularly in regard to the various combinations of armament. In the ground attack version, provisions have been made for installing two .50-caliber machine-guns in each outer wing panel outside the propeller arc. These are aimed by the pilot. In addition the upper Martin turret accommodates two .50-caliber machine-guns and the lower gunner's compartment can be fitted with a movable .50-caliber weapon, giving a total of 7 machine guns in all.

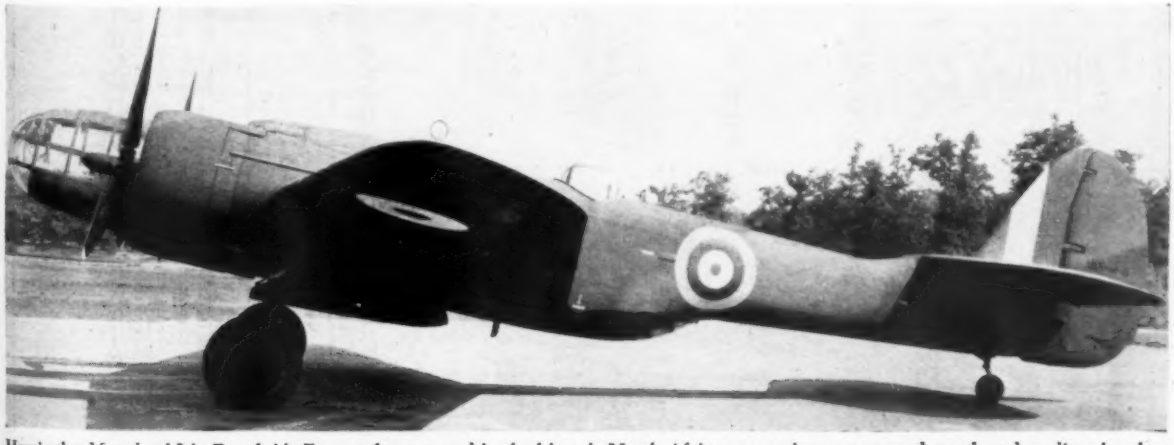
The bomb bays accommodate 1,250 pounds of bombs in various combinations, usually a dozen 110-lb. fragmentation bombs for use against personnel, gun implacements and light supply or military installations. For use against heavier targets, two 500-lb. bombs may be carried or a single 1,000-lb. demolition bomb.



Although this is the *Baltimore*, a later version, details of wings and tail are similar

For long-range reconnaissance work, extra removable fuel tanks may be carried within the bomb bay and cameras may be installed in the lower portion of the fuselage. As a medium bomber, a 2,000-lb. bomb is carried over short range.

VICTORY



Here's the *Maryland* I in Royal Air Force colors as used in the historic North African campaign as a ground attack and medium bomber

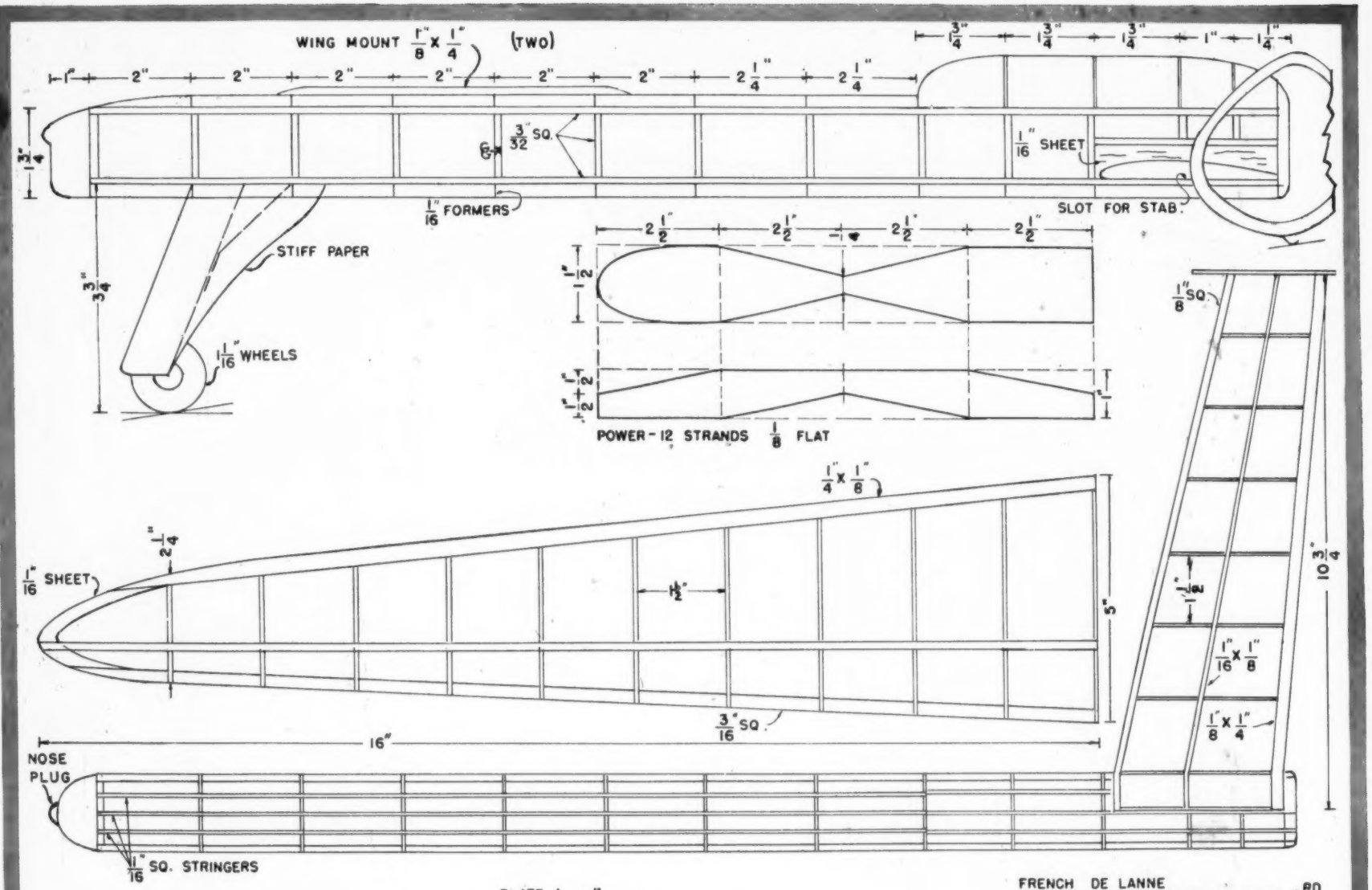
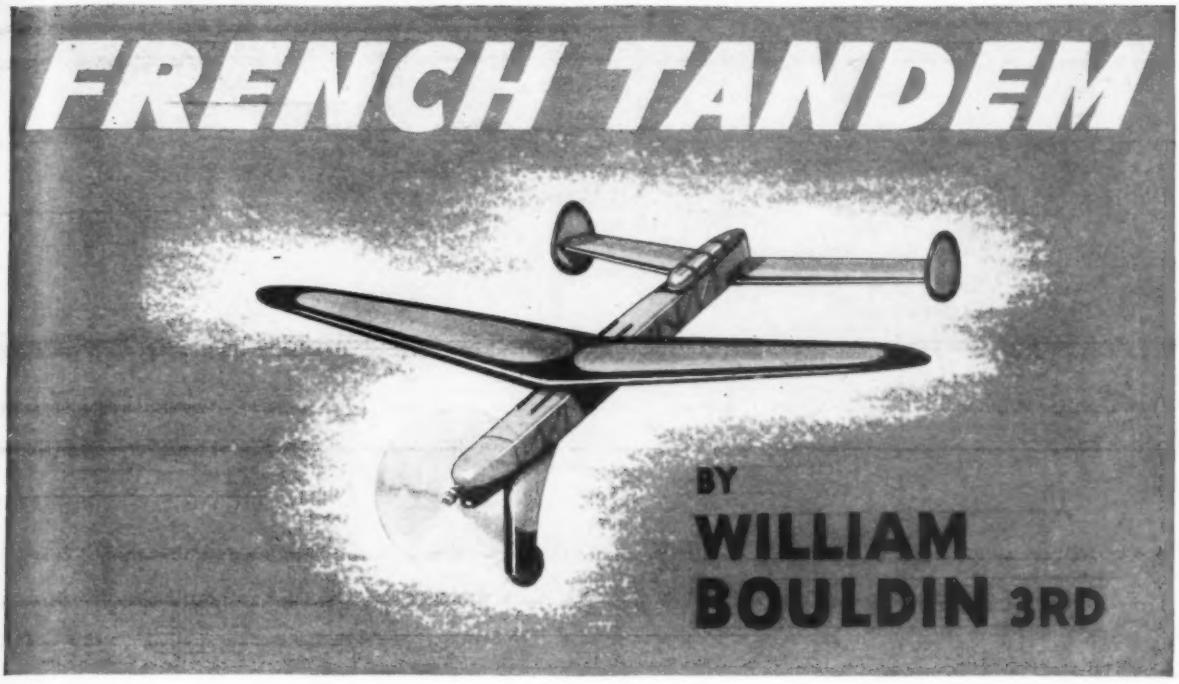


PLATE 1
DRAWN TO 3/8" SCALE

FRENCH DE LANNE
DESIGNED BY- WILLIAM BOULDIN 3RD
DRAWN BY- DEWEY MEDRICK

FRENCH TANDEM



BY WILLIAM BOULDIN 3RD

Flying scale DeLanne with contest ability

THE DeLanne Tandem monoplane is a long range, high speed, French military fighter. It is unusual not only because of its armament, but also because of the arrangement of its components. The DeLanne's armament consists of two fixed guns in the forward wing leading edge, a cannon firing through the propeller hub and a swivel mounted rear gun. The plane is manned by a pilot, a radio operator and gunner. The rear gun has an exceptionally wide range, due to the great span of the tandem plane, which is also the stabilizer, and the placing of the cabin at the extreme rear of the fuselage.

Aerodynamically the tandem plane arrangement is a modern version of the famous Langley "Aerodrome" steam driven models which were successfully flown in 1896 demonstrating for the first time, it is believed, the practicality of mechanical flight. You will find the theory of tandem planes most interesting.

The model presented here is a flying or semi-scale model and therefore, of course, modified for increased flying ability. As to contest possibilities, a moment's thought will show you the advantage of the added area in a weight rule model. Our suggestion is that you build and fly the DeLanne as given here until you know the type's every trick and then develop a purely contest model. Either model will furnish a great deal of aeronautical fun.

Construction is simple and other than a few pointers will not be given in detail. Let's get under way by scaling up the plans to full size. One quarter inch squared ruled paper is an aid in doing this. Do not forget that you have a right and left wing.

The fuselage is a square frame with the formers and stringers added. Build it of 3/32" sq. balsa. See that it is true. Add strips of 1/16" sheet for the formers, unshaped; run the center stringer of 1/16" sq. Then cut and sand the formers to shape completing with the remaining stringers. Installing the cabin should be clear from the plans. Don't, however, cement the 1/16" sheet fillet over the stabilizer until after the final flight adjustments are made.

The stabilizer is constructed in one piece. It is tapered in plan and form by the method used in building the wings. It may be held in place with a rubber band.

The wings are built in halves, joined at the center after blocking up the tips 2 1/2" for the required dihedral. The basic airfoil is the R.A.F. 32. Cut the required number of ribs all the base rib size. Then, having your trailing edge pinned in place on the plans, measure the ribs for length and cut. Now mark each rib for trailing edge thickness. Then with your rib template placed on a rib slide the template up until the bottom edge lines up with the trailing edge thickness mark. Cut along this edge. Cement rigs to the trailing edge and set in the leading edge. Add 1 1/8" x 1/4" spars and tips. Sand to finish shape when cement has dried.

This method of making tapered wings gives, where an undercambered airfoil is used, a gradual wash out from the deep undercamber of the base rib to a streamline rib at the tip.

Power the model with 10 to 12 strands of 1/8" flat rubber. Hand carve the propeller shown on the plans of hard balsa or use a ready-made hard wood one.

The nose block is carved to shape after being cemented to the fuselage. A ready-made hard wood nose button is used. The remaining constructional details hardly need any explanation.

After covering, water spray and dope the fuselage and all surfaces.

It is now necessary to balance the model before it is ready for flight, and as it is a tandem with both wing and stabilizer carrying part of the load, the center of gravity will not be where it normally is on the average tractor. However, with everything on but the main wing find the longitudinal balancing point, or c.g., and mark it. Place the wing with the trailing edge slightly behind this mark. Give the wing about 2° positive incidence and leave the stabilizer at zero. These settings are measured from the thrust line. Now try a glide. The wing may have to be moved slightly and you may have to lessen the lift of the stabilizer to get a good glide. Continue to adjust the relative positions of wing and stabilizer until a satisfactory glide is obtained.

Now try a power flight. It is always safer to let a model R.O.G. on its first flight, less damage being done if adjustments are not correct. After your final adjustments, give the DeLanne the gun and expect as pretty a model flight as anyone could ask. Hop to it and good luck.

VICTORY

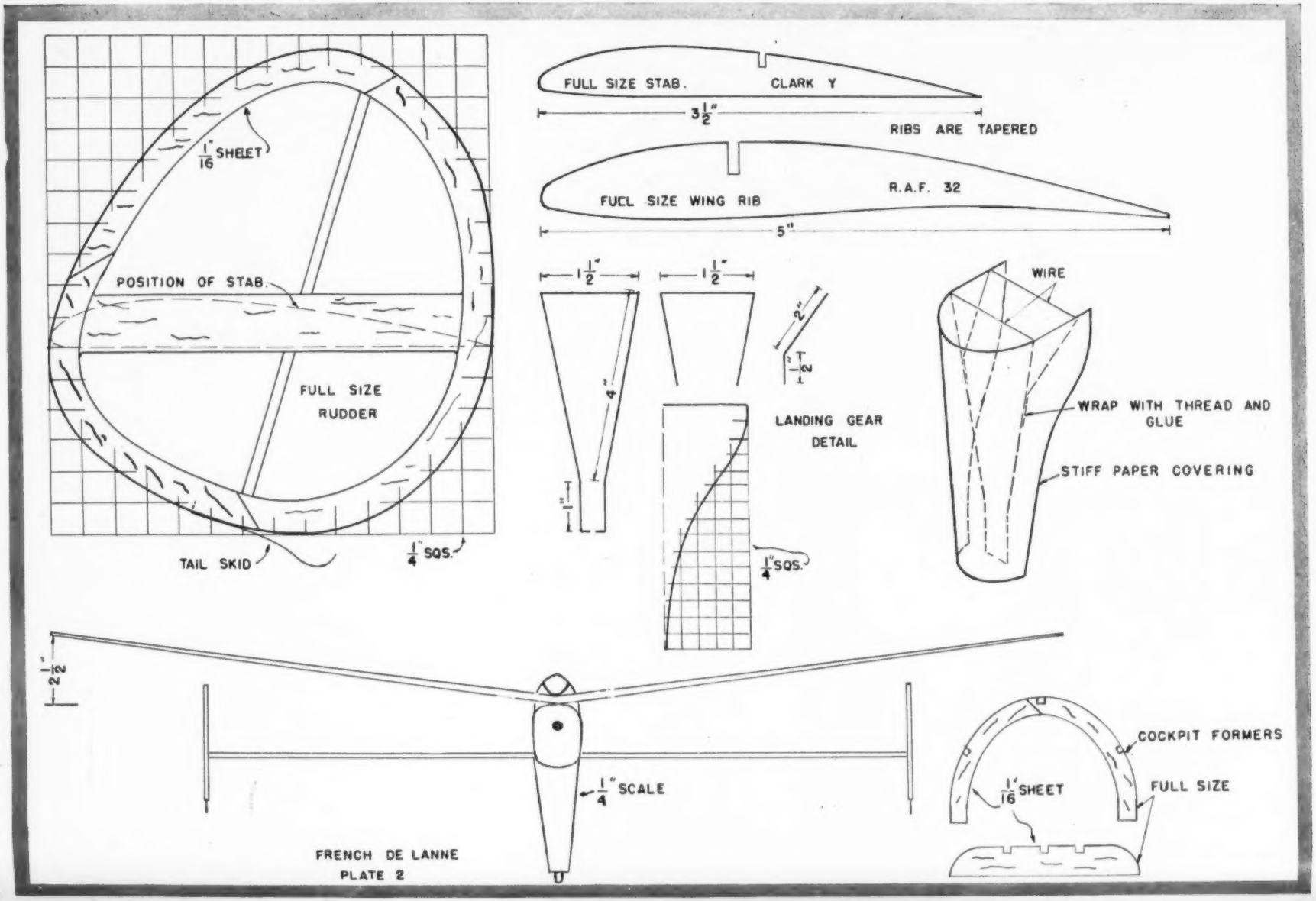
DID YOU KNOW THAT:

During the last war, all British airplanes were designed and developed at the Royal Aircraft Factory, later to be known as the Royal Aircraft Establishment (to avoid confusion with initials of Royal Air Force), and after perfection were turned over to private industry for mass production?

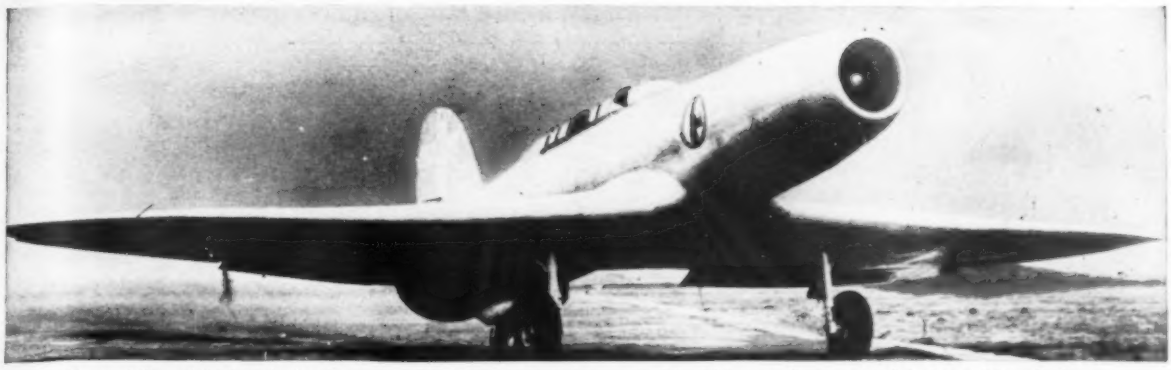
After the last war, Eddie Rickenbacker, America's No. 1 ace, became Sales Manager for General Aviation, whose president and Chief Designer was Anthony Fokker? "Rick" thus was employed by Fokker, a name he had come to know well on the Western Front!

In 1920, M. Flandin of France warned his people and the world that Germany was soon to become a world power through the development of an huge air fleet? Germany's "secret" rearmament in the air has been common knowledge for twenty years!

Frederick Koolhoven, the famed airplane designer and manufacturer in Holland (prior to the war), was a famous aviation designer in England during the last war? He was responsible for several well-known R.A.F. fighters and bombers.



FRENCH DE LANNE
PLATE 2



Caproni-Campini CC-2 is development of earlier single-seat test model. This was first successful thermal-jet airplane

Royal Air Force Cadet Frank Whittle at the age of 19. He joined as apprentice in 1923

Squirts

(Continued from page 11)

motion resulting from any jet flow or reaction motor is based directly upon the amount or mass expelled from the nozzle, this latter installation is ideal using atmospheric gasses under pressure as the bulk of the mass being exhausted. This bulk is not carried aboard the aircraft as is done in the two previous methods thus enhancing the overall aspects of this unit, and permits sustained operations over a much longer period of time for equal weight of fuel carried.

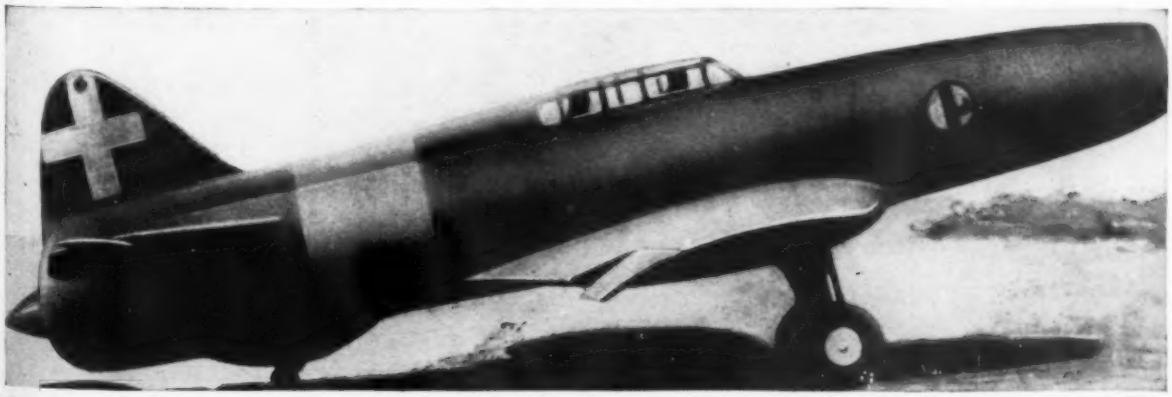
Among the earliest indications of interest in the thermal air jet can be credited to a patent awarded to Secundo Campini of Milan, Italy. The patent was issued by the United States in 1932 under the number 2024274. The basic idea covered by the patent was a jet propelled aircraft which was designed to scoop in air in great quantities, compress it by means of a pump requiring a separate motor, passed the compressed stream of air through a heating unit, or combustion chamber, burning oil to further increase velocity, mass and energy content and then expelled it through an exhaust nozzle or annular opening at the tail end of the fuselage.

No further word was had on this type of installation until July 30, 1939 when the aviation section of the *New York Times* described in detail the successful flight of a thermal air jet propelled aircraft designed by Frank Whittle in England. Since this preliminary release, we have learned that the Gloucester Aircraft Co. Ltd., of Gloucester, England, was the fabricator of the first jet airplane and that a group known as Power Jets Ltd., under Whittle had built the power units.

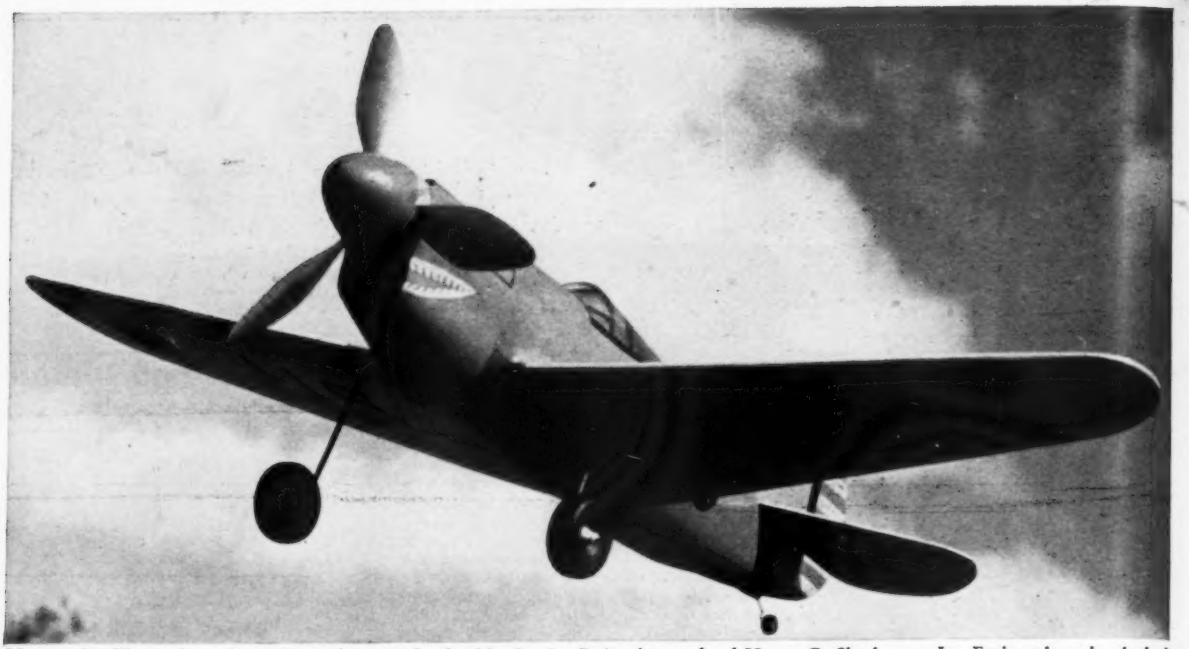
After satisfactory completion of the many flight tests, this government was allowed access to the British secret. Having studied the Whittle plans and experiments, the General Electric Company undertook construction of the first thermal air jet power units in this country. Through splendid coordination and through the efforts of D. R. Schoults and D. F. Warner the General Electric Company completed the first units to the complete satisfaction of the Army Air Forces. The Bell Aircraft Company, having established its interest in jet propelled aircraft, with the military, was commissioned to design and construct an airplane powered with two of the Gen-

(Turn to page 34)

Group Captain Frank Whittle today, who perfected jet-propelled plane. Note similar poses



Weighing 5 tons, the CC-2 has 130 mph speed. Col. de Bernardi carried passenger and mail for 169 miles in 2¼ hrs. on Dec. 1st, 1941



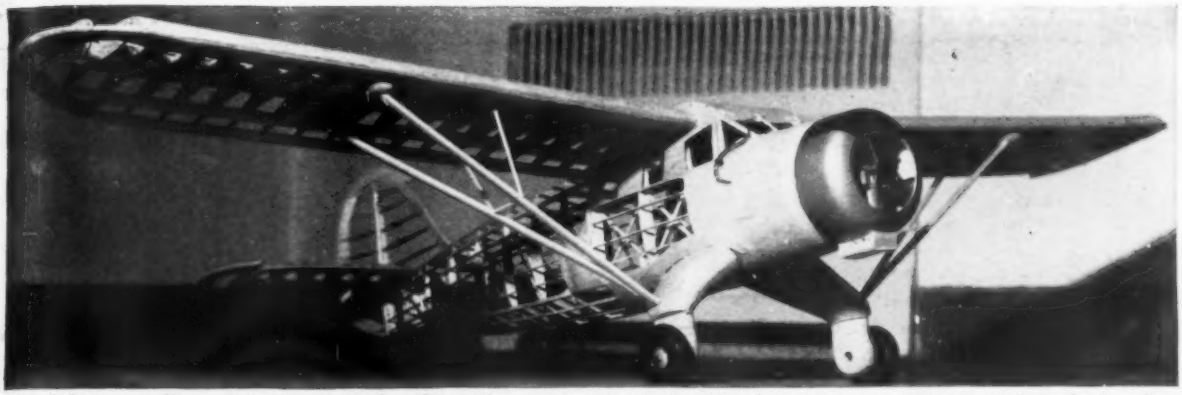
No. 1. An illustration of excellent photography is this Curtiss P-40, the work of Henry G. Sherburne, Jr. Entire plane is planked

AIR WAYS

No. 2. Detail scale model of Vought *Corsair* by Dwight Brooks, St. Paul, Minnesota

IT SEEMS fitting that tribute be paid to those modelers who have continued to keep the science alive through these trying years of war. Our nation expects of each of us his or her mightiest effort to produce the world's largest and best equipped fighting force. That we are engaged in an all-out effort to support our men overseas with thousands of planes and ships, tanks and guns, is an expression of faith in our democratic institutions and our free way of life. This effort means that *everything* which can remotely be of assistance to our war machine must be allotted to that purpose and it is only with the remainder of materials that the airplane modeler must work. It is heartening that so many have carried on the science of airplane modeling in the face of so many difficulties. These difficulties are those, largely, of time, working and flying space. The war worker can snatch only a few hours for the relaxation and education that airplane modeling gives. The

No. 3. Pfc. LeRoy S. Hubbard's kit Lockheed Hudson bomber has planked fuselage and carefully detailed turret and cabin



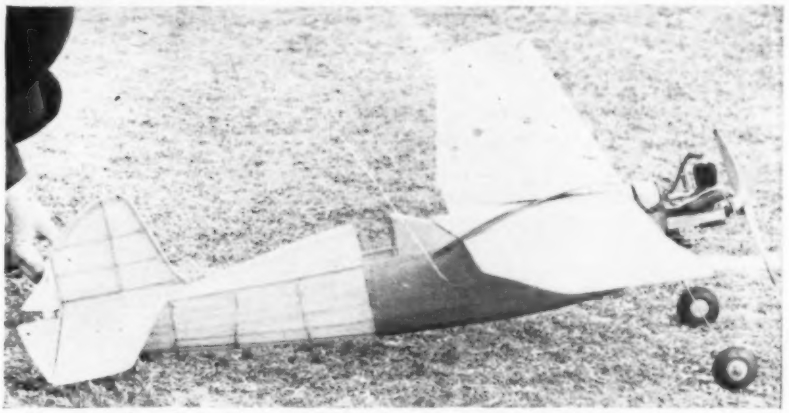
No. 4. An outstanding technical example of model airplane construction is this Noorduyn *Norseman* UC-64 by J. S. Luck, Canadian

fighting man often has only a few minutes a day to read the latest information on the science. Some manage to build models while in camp. Those too young for the services are engaged in preparatory training for the time when they, too, will be privileged to serve. From this group of soldiers, war workers and youth will spring America's aviation in the future. Buried in this mass of manpower are those mighty few who have zealously overcome obstacles to continue their experiments. Some of them are mentioned in Air Ways this month.

Picture No. 1 comes from George Sherburne, 15 S. Lincoln St., Bradford, Mass., and shows a Curtiss P-40 built by his brother, Henry G. Sherburne, Jr. A control-line job, it is powered by a Brown Junior Class C motor. The fuselage is planked with 1/8" and the wings with 1/16" sheet balsa. It mounts a 2-1/2 oz. gas tank which is made of shim brass. The beauty of the photograph is a contribution by George, who is a commercial photographer.

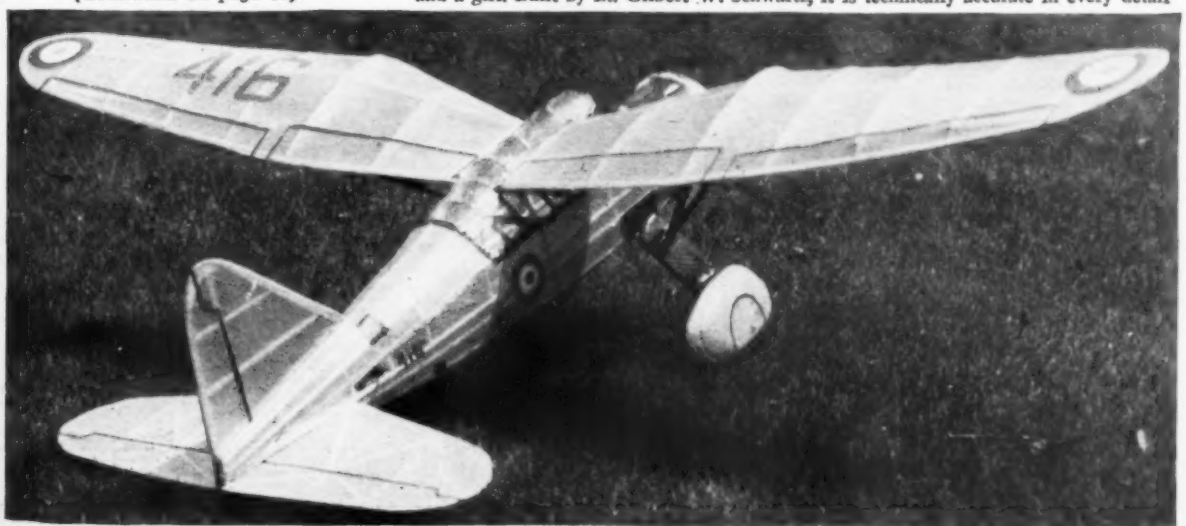
Picture No. 2 shows the Vought *Corsair* Navy observation biplane and is the work of Dwight Brooks, 176 North River Blvd., St. Paul, Minnesota. Dwight gave no details about the model but a close study of the photograph will reveal the great pains he took in the interest of technical accuracy in the faithful reproduction of the big ship. The impression of fabric being drawn tight against the fuselage steel tubing is especially noteworthy.

(Continued on page 52)

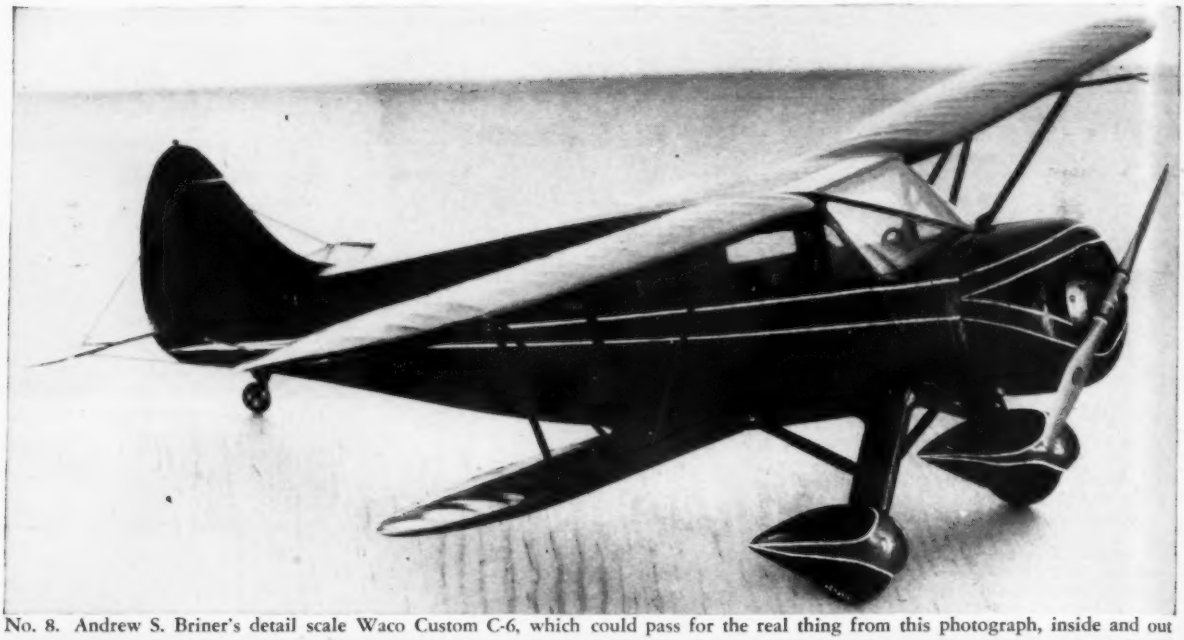


No. 5. A free flight Varsity redesigned for control line flying by Charles Daniel. The cockpit adds the desired realism to this model, which has flown a dozen times

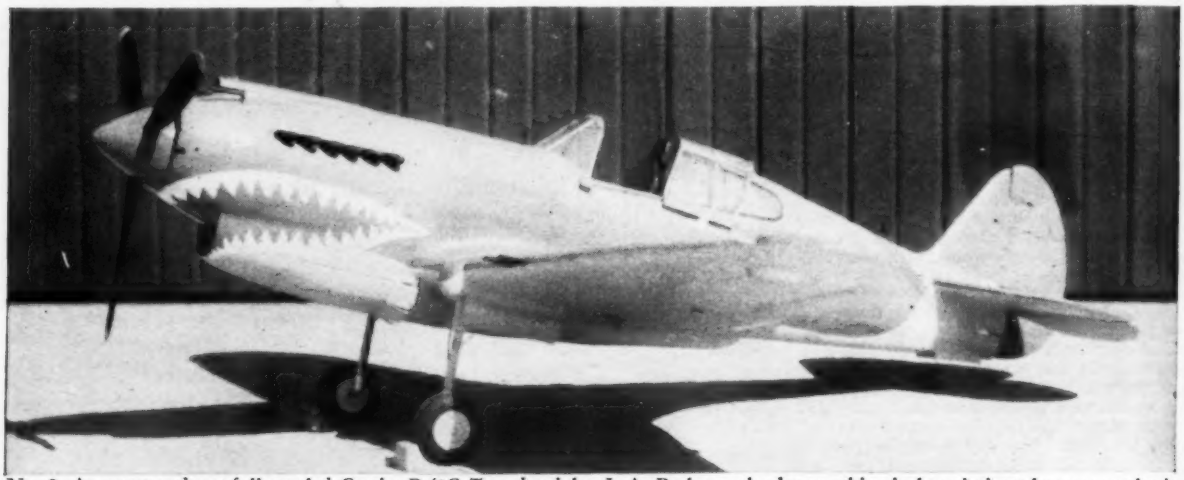
No. 6. This Republic P-47 *Thunderbolt* was a cooperative venture by three men and a girl. Built by Lt. Gilbert W. Schwartz, it is technically accurate in every detail



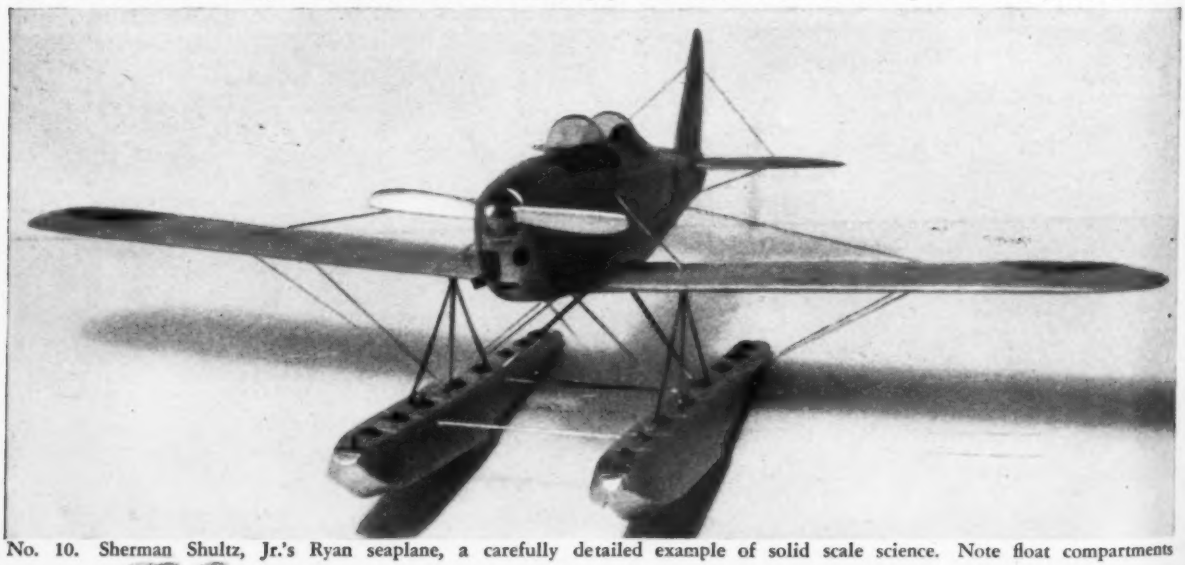
No. 7. Fred Patterson's Westland *Lysander* built from planes appearing in M.A.N. Later rebuilt with many improvements



No. 8. Andrew S. Briner's detail scale Waco Custom C-6, which could pass for the real thing from this photograph, inside and out



No. 9. An exact and carefully scaled Curtiss P-40C *Tomahawk* by J. A. Barlow, who knows this airplane intimately as a mechanic



No. 10. Sherman Shultz, Jr.'s Ryan seaplane, a carefully detailed example of solid scale science. Note float compartments

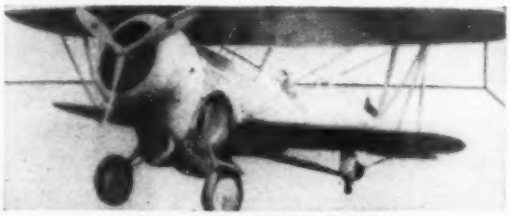
Announcing 4 NEW DE LUXE SCALE MODELS *shown below*

GRUMMAN F6F3 HELLCAT NAVY FIGHTER

41-1/2" Span. 1" Scale. Weight 6 oz.

Special De Luxe model. Very good flyer. Set has all parts printed on balsa, turned wheels, insignia, set of paints, glue, full size drawing, and all parts. Set..... **$4.50**

CURTISS HAWK F11C4 NAVY PURSUIT



32½" Span. Length 23¾". 1" Scale
Color grey, top wing yellow

THE MOST EXCLUSIVE AND FINEST MODEL IN THE WORLD. MOVABLE CONTROLS WORK FROM COCKPIT. One of the most beautiful models ever made. Set has all parts printed, insignia, instrument board, step plates, turned 4" motor front, wheels, 6 oz. colored paints, glue, retractable gear, and full size drawing. Construction set..... **$4.50**

BOEING B-17 FLYING FORTRESS BOMBER

44" Span. Length 30". Color Silver. Weight 6 oz.

THE MOST SENSATIONAL EXCLUSIVE BOMBER SET IN THE WORLD
Set has all parts printed, four 2" special finished motor fronts, wheels, set of paints, glue and full size drawing. Set..... **$4.50**

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SPECIAL FEATURES: ALL BALSA CONSTRUCTION, PLANKED BALSA BODY, USES "B" OR "C" CLASS GAS MOTOR, INVERTED CONCEALED IN RADIATOR

This is one of the strongest models ever built. Suitable for U control, free flight, or even as a De Luxe exhibition model, for class work, etc. Construction set has all parts printed on balsa wood. Uses ⅛" x ⅜" balsa body planking. Large insignia, celluloid, axle wire, clear dope, glue, full size drawing, and all parts. Const. set, without motor..... **$9.00**

VOUGHT CORSAIR F4U1 NAVY FIGHTER

40" Span. 1" Scale

Special De Luxe Model. Very stable flyer. Set has all parts printed on balsa, 4" turned motor front, etc., set of colored paints, insignia, full size drawing, and all parts. Construction set..... **$4.50**

NEW MARTIN B26 U. S. ARMY BOMBER

40" Span. Length 35". 1/8" Scale. Color Silver

A beautiful model of the world's fastest bomber. Set has all parts printed, wheels, insignia, 4 oz. grey paint, 1 oz. black, motor fronts full size scale drawing, and all parts to build. Construction set..... **$4.75**

Thousands of this type of plane are fighting for the U. S. and Britain

GRUMMAN F3F1 NAVY FIGHTER

32" Span. Length 24". 1" Scale

A fine detailed model with retractable landing gear, 4" turned motor front, 3 oz. grey dope, 1 oz. yellow, 2 oz. glue, etc., all parts printed, wheels, full size drawing, and all parts. This fighter plane is used in large numbers on the aircraft carriers. Const. set..... **$3.75**

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34" Span. Length 29". 1" Scale

The best detailed model of this plane on the market. Set has all parts printed, turned wheels, insignia, complete set of paints, glue, etc., full sized drawing, and all parts. Const. set..... **$3.50**

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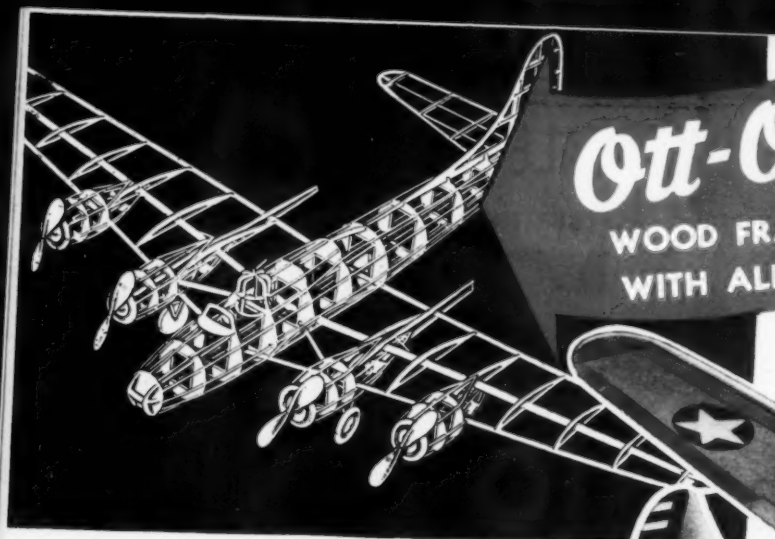
83 DANIEL LOW TERRACE, STATEN ISLAND, NEW YORK



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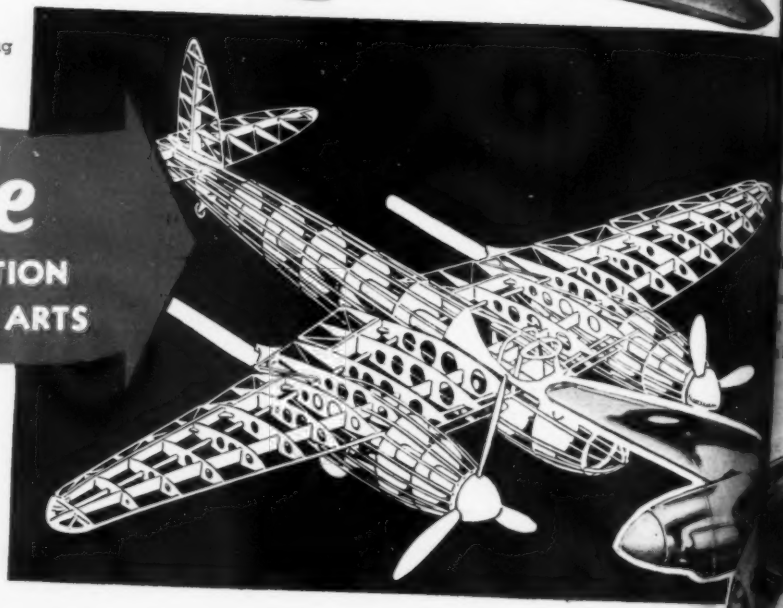

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Try both construction methods as illustrated—you'll like them both. And with either one you'll get your model flying quicker, for all body formers, wing ribs, tail and landing gear parts are ready-cut. All the hard work is done.

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True-to-Scale $3.00

*DeHavilland Mosquito DH98

A brand new true-to-scale model of this famous low-level bomber. Scale ¾ inch to one foot. Wing span 40⅝ inches.

*Kits marked (*) are Ott-O-Tube Construction

North American Mustang P-51
Grumman Wildcat F4F
Curtiss Warhawk P-40
Douglass Dauntless SBD

mer

EDUCATIONAL

AIRPLANE KITS

BE
ON

(Continued from page 27)

eral Electric units.

Full credit for the successful design of the Bell airplane is due Harland M. Poyer, Herbert L. Bowers, Robert A. Wolf, James S. Limage, Edgar P. Rhodes, Randolph F. Hall and the host of other engineers who were assigned to the project. Subsequently, Brigadier General B. W. Chidlaw, Chief of the Materiel Division and other high ranking officers were testing the new jet airplane. The results of the joint Anglo-American efforts have now become general knowledge. We daresay they will be even more gratifying as the experiments progress further.

In addition to General Electric's work on thermal jet motors, there are others among which Westinghouse is perhaps the most enterprising, also working at this moment developing units operating on the same principle. Jet propelled airplanes, no doubt, are also under construction in plants other than Bell and will soon be flying experimentally. If we pause to reflect, it becomes evident that jet propulsion has in a short space of time become a reality. Now that the miracle has come to pass, let us analyze the series of events which have brought it about.

On August 1940, at Taliedo airport near Milan, Col. Mario de Bernardi, flew a jet propelled airplane for several minutes. The airplane was one built by the Caproni Works and used the thermal jet motor developed by Secondo Campini. The craft known as the Caproni-Campini CC-1 weighed about 8,800 lbs., was a single place low wing monoplane and used the jet motor only as an auxiliary to the main powerplant. Taking off in a normal manner, using its engine and propeller, the pilot switched to the jet motor after gaining altitude and flight was sustained without the use of the airscrew. In December of the following year, Col. de Bernardi flew a second airplane, the CC-2, much larger than the first, and powered only with a jet propulsion installation. The new aircraft weighed about 11,000 lbs. and maintained an average speed of 130 miles per hour. It has been officially known to have completed a cross country flight of some 168 miles. A passenger and mail was carried during this flight. When last heard of the craft was undergoing further tests at the Guidonia Research Station. Other than to state the principle whereby the CC-2 flies without any form of airscrew, and to release the few facts herein contained, the Italians have revealed no further information. However, we assume the airplane follows the Campini patent wherein air enters through a circular intake in the nose of the airplane and passes through an expansion chamber wherein velocity is reduced and pressure increased prior to its entry into a motor driven compressor. The air then leaves the compressor with increased velocity and temperature, and passes through a heating chamber in which fuel oil is burned. As a result, the products of combustion in leaving the chamber have a greatly increased temperature and velocity. They are then ejected through a nozzle at the tail at atmospheric pressure. The kinetic energy thus induced is of sufficient magnitude to sustain the aircraft in flight. Judging from the photographs of the airplane which have been released however, at best, the Italian installation appears to be very cumbersome and grotesque from an aerodynamic point of view.

With one exception, Frank Whittle's installation operated much the same as the Campini airplane, sucking in air, compressing it, passing the compressed air through a heating chamber and then using the mass of hot gasses to operate a gas turbine before passing them out through an exhaust nozzle utilizing their reactive force. The addition of a gas turbine to the thermal circuit was the major variation from the Campini system. The turbine used to drive the compressor eliminated continual operation of an auxiliary power plant required in the Italian installation. For effective starting however, a light starter engine is believed to be employed, this being disengaged once the thermal cycle had started and the gas turbine attained its prescribed output. Inasmuch as the turbine was capable of driving a compressor, it would indicate that very marked improvements had been made with turbines which were until this time generally considered inefficient and impractical for such uses.

A second difference between the Anglo-American jet propelled airplane and that of the Italian's is that the former made use of twin units installed in the outriggers or tail booms while the latter was a single unit airplane. Use of twin units resulted in a more practical design from the aerodynamic standpoint reducing considerably the cross sectional area of the individual jet motor nacelle or housing in addition to increasing the output or power of the aircraft.

The Japanese Sozukase firm has produced a successful jet-propelled plane which is claimed to have been flown extensively in the Spring of 1942. No details of the system have been revealed.

Present installation we believe have been developed to the point of compactness wherein the entire jet unit can be installed within the wing chord of the airplane. This being the case, it is conceivable that within the near future such units might be made available to aircraft in combat zones and perhaps will alter the entire course of aerial operations. To understand the potentialities of this new motive power, let us study more closely the various components that go into the making of a jet propulsion unit.

The first piece of equipment in the jet propulsion installation is the compressor or blower as it is sometimes called. The primary function of this apparatus is to feed air into the thermal circuit in the quantities and speeds required. The required amount of atmospheric gasses handled by the compressor are directly dependent upon the ratio of fuel intended for burning in the combustion chamber and the ratio of oxygen to other gasses in the atmosphere. The secondary function of the compressor is that of compressing the intaken air and increasing the velocity, compression, and temperature. Inasmuch as there is a definite preestablished rate of airflow dependent on the other units in the system and the desired total output of the installation, the number of stages required in the compressor becomes a design problem which will vary with each installation. To prevent overheating and expansion of the air in the compressor, intercoolers are provided between each stage of compression.

In the majority of cases, the first stage of our compressor may be considered nothing more than a refined fan. As the air is passed from this to the secondary

(Turn to page 36)

Squirts

(Continued from page 34)

stage the apparatus begins to resemble a supercharger impellor wherein concave fins are placed at right angles on a disc attached to the rotating shaft, scoop the incoming mass of air as they rotate and by centrifugal action spill it into a collecting outlet or chamber on the outer periferi of the casing housing the revolving disc. With each stage this collection chamber and duct become smaller in direct proportion to the amount of compression, and velocity that must be attained by the air flowing through, until the final stage imparts the predetermined speed and temperature required by the installation.

The determining factors in the proper choice or design of compressors for jet propulsion installations, are dependent upon: first, the weight of the atmospheric gasses required to flow through the apparatus per minute and, second, the speed at which the fan blades and impellors are required to revolve. This becomes of major importance considering that we are limited as to the speed at which the blades may revolve without encroaching the critical tip speeds which make the present day airscrew impractical for extremely high velocity operations. Because of this consideration we find that some installations eliminate the fan completely relying solely on impellors and pumps. The horsepower absorbed in operating the unit and the speeds at which efficient operation is obtained will vary with each particular application of the jet device.

As the gasses pass through the final stage of the compressor they are injected into a heating or combustion chamber wherein their temperature is greatly increased by the burning of fuel. This operation may well be analyzed in the same manner as the liquid fuel rocket motor described earlier in this article. The purpose of this operation in the thermal circuit of the jet motor is primarily to increase the temperature, velocity and mass of the medium flowing through the system. Once fuel has been oxidized and the above characteristics have been attained the products of this combustion may be discharged into the atmosphere through a conical nozzle advantageously using what kinetic energy and reactive force is made available through the velocity and mass increase. The thrust resulting from this operation is explained by Newton's Third Law of Motion which states "that for every action there is equal and opposite reaction".

This law can be represented by the equation

$$MV = mv$$

M representing the mass of our installation of airplane

V representing velocity at which it should travel

m representing the mass of gasses exhausted into the air

v representing the velocity at which they are expelled through the nozzle.

Theoretically, this formula represents why there should be thrust. However, to determine the true value of available thrust derived at through the jet principle, many other factors must be considered, among which thermal efficiency and velocity-ratio efficiency are of prime importance.

Thermal efficiency as applied to jet propulsion signifies that portion of the theoretically available fuel heat content which is converted into kenitic energy at the jet or nozzle. Velocity ratio efficiency is that figure derived at by comparison of the velocity of the exhaust gasses to the speed at which the aircraft travels. Thermal efficiencies of rocket motors it has been determined are low. This being due to the fact that dissociation, or only partial oxidation of the fuel, is experienced; an appreciable amount of heat realized is lost in the exhaust gasses, and a skin friction created by the exhaust gasses in the nozzle create a further loss in what is commonly termed "nozzle reheat".

Thus, from the point of thermal efficiency, the rocket type motor is not too startling. This is one of the major disadvantages of the Campini type of unit whereas, considering the addition of a gas turbine to the cycle, as in the Whittle installation, we find that certain of these disturbing conditions are somewhat alleviated.

Primarily, the introduction of a gas turbine to the circuit, as we have previously indicated, is made to provide a method by which the compressor can operate and a cumbersome auxiliary engine can be eliminated. With a gas turbine in the system, instead of exhausting the mass of extremely hot gasses and unburned fuel into the atmosphere, we inject the exhaust into a turbine which translates its energy content into mechanical output efficiently expanded. The mass of the gasses in toto remains constant, the volume slightly increases due to further oxidation of the unused portion of the fuel in the exhaust, and the heat previously lost in the exhaust is put to good use. A slight reduction in velocity of gasses expelled from the turbine into an exhaust nozzle is not too alarming, tending to create a more favorable velocity-ratio efficiency factor and reduce "nozzle reheat" losses.

For practical design purposes it is likely that a battery of combustion chambers are employed in the system, each directing its exhaust into the turbine.

The thermal air jet installation might well be compared to an open-cycle constant-pressure combustion gas turbine, (Page 11) wherein a rotary compressor draws in air from the atmosphere, introduces it under pressure into a combustion chamber or a battery of combustion chambers into which fuel is injected and burned. The products of this combustion are expanded through a turbine resulting in mechanical energy used to drive the compressor. From the turbine the gasses are then released into the atmosphere.

Inasmuch as the thermal efficiency of such a cycle is dependent solely on the minimum and maximum pressure ratio and not on the absolute magnitude of pressures, within specified minimum and maximum temperatures of the circulating medium (air-fuel) the lower the pressure ratio the higher the efficiency. In our case the initial temperature is that existing in the combustion chamber and the final temperature is that existing at the outlet of the turbine exhaust nozzle. In formula the cycle or highest possible efficiency is:

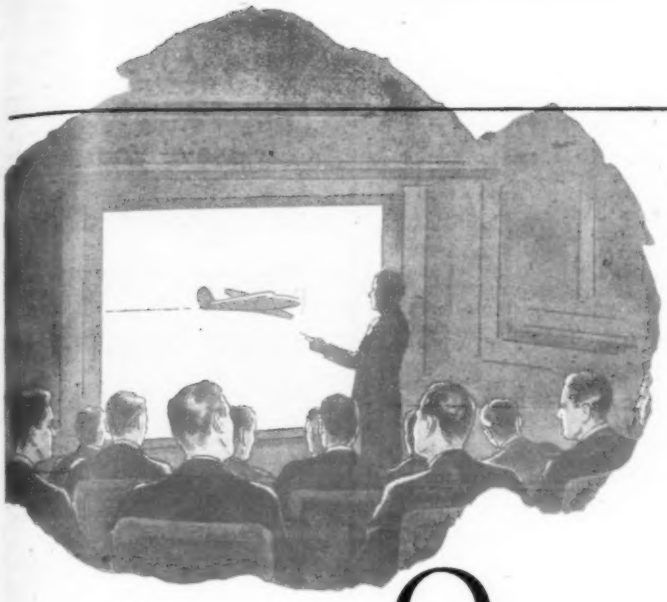
$$\frac{Ec = T_1 - T_2}{T_1}$$

where Ec equals the cycle efficiency

T_1 equals initial temperature of the cycle

T_2 equals final temperature of the cycle.

(Turn to page 38)



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ONE OF the wonders of this war is G. I. training . . . the tremendous amount of education and training accomplished in *hours* instead of weeks, and in weeks instead of *years!* Instead of the two to four years formerly required for a foreign language, the army produces practical conversational foreign language in a few hours. New methods are being used that teach in a few weeks the essential mathematics and physics of an entire high school or college course.

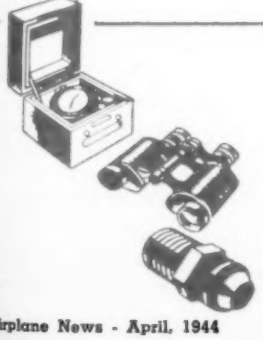
Accepting only those candidates of high physical and mental qualifications for its cadet training, the Air Force immediately equips these future officers with a liberal education, and proceeds in the same thorough and intensive manner to turn them into experienced and highly skilled pilots, navigators, bombardiers and gunners—men who are disciplined, tough, keen and resourceful. Every man who graduates into the air force is equipped to take care of himself under every conceivable circumstance.

The desire to become a flier usually comes when a lad is very young. Fascinated by airplanes, he begins by building simple little models, and as his skill grows, more complicated models and gas-powered types soon follow. In these preliminary stages, Megow Model Kits have held a dominant place for years, encouraging and promoting aviation study among boys who are now flying and building for Uncle Sam.

Today the large manufacturing facilities of this company are turned to war production, and hobbycraft lines are produced only in limited quantities. We hope our friends and customers will all approve and not feel disappointed when their favorite kits are not obtainable.

In the meantime, post-war plans are under way for the production of new Megow models that will match the tremendous changes in construction and design. New techniques and new precision methods developed in our war manufacturing will also bring great changes, and models such as never seen before. Many previous models are being discontinued, to be replaced by new ones when materials of the high quality required by Megow standards become available, and war production permits.

Most of the facilities that were formerly used in manufacturing Megow Model Kits are today producing Ship Chronometers, Binoculars, Airplane Motor Fittings and other articles of great precision and highest attainable quality.



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(Continued from page 36)

It is interesting to note that if the final pressure were made to approach zero, cycle efficiency would indicate almost 100%. For expansion with a diverging nozzle to atmospheric pressure, the cycle efficiency would be equal to approximately 35% in accordance with available figures based upon combustion chamber temperatures of 3000 degrees Fahr. and chamber pressures of about 300 lbs. per sq. in. A recent German analysis of overall efficiency factors of the jet motor and the reciprocating engine indicates as 80% maximum efficiency factor for the former as against a 30-35% maximum efficiency factor for the latter. Although this comparison is open to sufficient argument, results obtained from actual experience with jet propulsion motors indicate conclusively the overall power and efficiency advantages.

Inasmuch as the development of the jet propulsion engine and that of the gas turbine has been so closely associated with one another our analysis of these systems would be incomplete without mention being made of the regenerative constant pressure closed cycle gas turbine.

The basic difference between the open cycle and the closed cycle turbine lies in the flow cycle of the medium used. In the open cycle the gasses generated in the combustion chamber are used to propel the turbine and then are exhausted into the atmosphere. In the closed cycle system the turbine motivating medium constantly remains within the mechanism and the gasses burned in the combustion chamber are used to preheat, in a regenerative manner, the motivating medium in the lines leading to the turbine.

The closed system functions in the following manner. Gasses in the system are compressed in a blower then piped through a combustion chamber wherein they are heated and the flow velocity is increased. After this operation they are passed through the turbine resulting in mechanical output. The gasses on leaving the turbine flow through a refrigerated duct wherein temperature is lowered considerably and the medium made ready for re-entry into the blower. As in the open cycle system, within specified minimum and maximum temperatures of the circulating medium the thermal efficiency of the closed cycle is dependent upon the minimum and maximum pressure ratio and not the magnitude of pressures. The mechanical output of the turbine is utilized to drive an airscrew while the products of combustion generated in the heating chamber are passed through an exhaust nozzle imparting an added thrust to the mechanism.

The combination airscrew-jet method of propulsion affords an economical installation and permits a greater operating range per fuel consumed than the straight jet type. It is believed that some aircraft manufacturers are now actively engaged in research on the turbo-jet propelled type airplanes.

Although the installation of jet propulsion units will create new problems for the aeronautical engineer the solution of these problems will make little if any noticeable difference in the outward appearance of the aircraft. Except for the elimination of the airscrew, the jet propelled airplane of the near future will look no different from those of today.

(The information contained in the foregoing has been obtained from sources available to the general public and to be found in any good engineering library.—Editor) VICTORY

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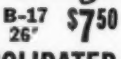

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Scale Model Radial Engine

(Continued from page 19)

top for effect. A disc of 1/32" sheet, 11/32" in diameter, is cemented to the rear of this as shown.

This unit is now mounted over section H and set tightly up against disc E. Now we have the slightly complex job of building two magnetos. These were built a bit larger than they ordinarily appear in order to make them more prominent, and to ease construction. Piece No. 1 of the magneto is cut from 5/32" stock and shaped as shown. Make a duplicate right away, for the other magneto. Piece No. 2 is cut from a block of any thickness and sanded down to 3/16" width. Then the other angles are cut into it, and its back is sanded down to a gentle semi-circle. A little inspection cap made from thin cardboard is set onto the back of this piece, as shown.

Piece No. 3 is simply a 3/32" thick piece rounded to a diameter of 3/16" and mounted to piece No. 2. This piece will receive the synchronizer after assembly and placing. The magnetos, now finished, and placed up against section H, are set at the angle shown. Only about half of each magneto will be secured, as the other half overhangs, leaving a sizable space. A reed bushing of 1/8" diameter, 1/8" long, is set on top of each magneto. From this will lead the high tension conductor.

This high tension conductor, J, is made from 1/16" diameter reed, and bent into a slight curve. One end is then set in place on the magneto top and the other is cemented to the ignition ring as shown. The air intake duct has been simplified by using a 9/16" long, 3/32" dowel. On one end of this duct a circular piece of 1/32" sheet is placed. This air duct, O, is not placed on the motor until the carburetor is mounted in place, as it receives part of its support on the carburetor mounts.

The carburetor is simplicity itself. Three pieces of 1/16" sheet balsa are cut to sizes indicated and sandwiched in between three other squared pieces. These sections when assembled lend a significant appearance to what is intended to be the carburetor. If you care to, you may elaborate on this by adding smaller pieces here and there; but if assembled as it is, and painted with silver dots for bolts, it will be effective enough. The carburetor is now installed by cutting four stick pins to 1" lengths and pushing them into the corners at the top of the carburetor. The other end of these pins are in turn pushed up into section H, for final and secure mounting. Make certain that these pins are straight up.

Now the air duct, O, may be cemented to these, and to the bottoms of the magnetos. Which just about completes the job of assembly. Things are pretty well shaped up by now. The oil drain sump, M, is now made from 3/32" stock and carved to shape according to dimensions laid out. The name plate is sanded round from 5/32" material and attached to the sump as shown. This unit

is now mounted between the two bottom cylinders, a feature that is very familiar on radial engines. The emblem is simply an eagle imposed on a circular name plate.

Thus the job of assembling is complete. The motor as shown on the plans is now bloomed, and if followed faithfully throughout, you will have a most realistic copy of the prototype. If you intend mounting it in a model without inspection cowling for access to the accessories, the accessories described here will not be needed. This is optional of course. On the plane in which this original model was installed, the accessories are open to inspection by a hinged cowl. Many more such gadgets can be added to make this the ideal engine, if one cares to.

This engine is attached to your model by providing a mounting ring of reed, on the front of the model. Into this ring the rear of the engine is thrust; it is secured to this reed ring by tacking the intake pipes with dots of cement. A firm mount will result.

Before mounting it of course it must be painted; this is really what counts for appearance, and the thing that puts "socko" into the engine. Several coats of clear dope are applied overall; this makes a smooth foundation for the coats to follow. Now all the parts should receive several coats of navy gray, of light appearance, not the usual deep gray. This makes for a very distinctive and attractive metal color, and is used extensively on most commercial engines.

After these coats have set well and are dry, the cylinders, pushrods, intake pipes, magnetos and carburetor only are painted with a solid black dope. Two coats should be sufficient. All these coats should be thin so that the finish is not too lumpy. When these last coats are dry the various little sections that employ nuts and bolts should be dotted with silver paint to simulate nuts and rivets. The spark plugs are also silver, as well as the high tension conductor on the magnetos. The synchronizers and inspection caps, as well as piece No. 3 on the carburetors, are also painted silver.

The name plate is painted white, with a blue eagle, as shown on the plan. There should be exhaust manifolds too, but this engine was not finished to receive them at this writing. When the engine is mounted and painted you may install individual exhausts or connect each to a collector ring which will exhaust either under the fuselage or on the side. Reed of 1/4" dia. will make a good collector ring, with 1/8" extensions to the cylinders. For final and more complete effect, several lengths of music wire might be set in leading from the engine to the firewall, or first bulkhead. These and anything else that will look effective, are intended to appear as controls for the engine.

With the installation of this engine in your super detail job you'll be hard to beat in any scale event.

The above instructions and drawings have been presented with the famous Pratt & Whitney *Hornet* engine in mind. However, the Pratt & Whitney *Wasp* engine is identical for all practical purposes. The full-scale engines differ only in size, the *Hornet* weighing 775 pounds and developing 525 hp and the *Wasp* weighing 650 pounds and developing 425 hp. The *Hornet* series was discontinued in 1936 and the latest P&W is the huge Twin Wasp R-2800 developing 2,000 hp. By following the above instructions, either a *Hornet* or *Wasp* detailed scale model may be built.

VICTORY

(Continued from page 2)

ever built, a twin-boom monster carrying about twice the passengers of a DC-3. Under development for more than a year, it was this craft in which Dick du-Pont met his death at March Field, Riverside, California. The glider, however, did not crash due to any structural difficulties, but rather due to a shifting of shot-weighted bags, used for load testing. Sliding to the rear, the weights caused the C.G. of the craft to shift rearward, destroying its stability. Newest models have pleased General Arnold, and the type may soon be in production. . . . The first photograph of the British A.W.A. *Albemarle* Mk. I is shown on Page 2. A development of the *Beaufort*, major alteration is the use of twin tails and revised nose compartment. A top speed of 250 mph @ 10,500 ft. is claimed, with a range of 1,300 miles. A crew of 5 is carried and the duties of the craft include glider towing. . . . The Royal Canadian Air Force is now using six Boeing *Flying Fortresses* on mail carrying duties between Canada and England as well as Sicily and Italy. It was not revealed whether or not the planes had been modified to any extent for their cargo role. . . . The Joint Aircraft Committee (composed of members of the Army Air Forces, Naval Aviation and the Royal Air Force) recently made reference to an "F2G-1" Navy fighter, which would indicate a product of the Goodyear Tire and Rubber Company, and a new fighter, differing radically from the Vought *Corsair* FG-1 now being built by the firm. No details were given. . . . Grumman's brand new F7F-1 twin-engine fighter may go into action soon, it has been announced. . . . A new *Spitfire* VII has gone into action with extremely sharp, pointed wing tips. The tips are literally points, and the craft is known to be in action in Italy, if not elsewhere. . . . News from Germany indicates the appearance of the Focke-Wulf Fw-290, a refinement of the all-too-well-known 190. The new craft is fitted with a liquid-cooled engine, undoubtedly a Daimler-Benz, of 2,000 horsepower. Armament includes a 30 mm cannon, two 20 mm cannon and two 13 mm cannon. An improved high altitude capacity is claimed for the new engine. Admittedly a wicked opponent is the Fw-190 and this new version is undoubtedly a capable fighting machine. . . . the 30 mm cannon has also been fitted to the Messerschmitt Bf-109 fighter and the new version, possibly with the improved Daimler-Benz, is known as the Me 209. . . . Versions of the Short *Sterling* (known as the Mk. II) have been fitted with Wright *Cyclone* engines and the latest Avro *Lancaster* (Mk. II) mounts radial engines: four Bristol *Hercules* XVI. A new Avro bomber, about 20% larger than the *Lancaster*, is to fly in 1945. . . . Higgins, the famed Louisiana landing-boat builder, is in production on a helicopter. . . . Rumors of a new Ryan combat plane have been confirmed in a very startling way by Lt. Raymond Deitzer, U.S.N., Bureau of Aeronautics representative at the San Diego plant, who says: "It's the hottest thing on wheels and wings and the sooner it gets out and demonstrates its ability, the quicker this Far Eastern turmoil will end!" Such talk from a conservative Naval officer would tend to indicate something truly "hot" on the fire at Ryan. . . .

THE RECENT controversy over Representative Vinson's bill to create the ranks of "Admiral of the Navy" and "General of the Army," which are one step higher than our present top ranks, brought out still another indication of Air Forces autonomy by the mentioning of General Arnold as a recipient of such a title. Admiral King was, of course, mentioned for the former rank, and both General Marshall and General Arnold were said to be assured of the rank when, and if, the bill is approved. That the Commander of the Army Air Forces is considered to be equal in rank to the Chief of Staff of the U.S. Army by high military and congressional leaders is evidence of near-victory for proponents of an independent Air Force. . . . Henry J. Kaiser, upon hearing the report that his huge flying boat project is to be cancelled by the government, said he "will have a great deal to say" to any investigating committee called. "Mr. Hughes (Howard Hughes, movie producer and noted flier, partner of Kaiser in the undertaking) has offered a $500,000 guarantee to the War Production Board that the first ship will fly in 1944," says Kaiser. The latter blames the difficulties on lack of governmental cooperation as evidenced by refusal of metal, experienced personnel, etc., necessary to build the giants, largest airplanes ever attempted. . . . When the Nazis attempted to fly men and supplies into their 10 divisions trapped in the Ukraine, Russian Air Force pilots destroyed 73 Junkers Ju-52 tri-motored craft in a single day. . . . Republic P-47 *Thunderbolts* have been operating in New Guinea since Dec. 4th last and, according to the late Ray Clapper, outstanding columnist and warfront reporter, this group has shot down 111 Japanese airplanes since arriving, with a loss of only 2 Yanks! Since last July (when the *Thunderbolts* first went into operation in the South Pacific) this fighter group has downed 164 Nips with a loss of only 4 of our fighters! . . . General Electric has developed an electric motor so small as to fit in the palm of the hand and yet it develops 3 hp and turns over at the astounding speed of 120,000 rpm. Weighing only 7 lbs., such a motor will find hundreds of applications in the aviation field. . . . Maj. Gen. Claire Chennault, commanding the 14th Air Force in China, has divided his ever-increasing force into two groups. Col. C. D. Vincent is in charge of the wing covering Central, Eastern and Southern China, and Col. J. C. Kennedy commands the Western China Wing. Lockheed *Lightning* and B-25 *Mitchell* combat

(Turn to page 46)

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4-44

Flash News

(Continued from page 44)

planes are operating with the 14th, together with other types of equipment.

STORIES ABOUT the wicked handling characteristics of the Martin B-26 *Marauder* can now be reviewed in a more critical vein as the Army Air Forces announce that Women's Air Force Service Pilots (Wasps) are flying *Marauders* in sleeve-target gunnery training work at Harlingen and Laredo, Texas. . . . The War Department recently released a portion of the 8th Fighter Command's "air plan" when it outlined the relay system of fighter escort on the bomber raids over Germany. The *Spitfire* is used for short-range work, the *Lightning* and *Thunderbolt* for escort work on the first (high altitude) leg of the journey to the target. The *Mustang* is used for the complete trip, although its combat duty extends only to the target and the first leg homeward. The other fighters pick up the bombers on the way in. . . . Readers may recall newspaper photographs of a wrecked Japanese four-motored flying boat lying in a small lagoon seized by our Marines. It has been identified as the Kawanishi Navy HO-2, known as *Emily* to Yanks who insist on a more pronounceable name. . . . For the first time in history (maybe illegally) a party of 25 Mohammedan pilgrims made their annual journey to Mecca BY AIR! Not being a Mohammedan, we can't pass on whether or not a FLYING pilgrimage counts! . . . The *Brabazon*, named in honor of Lord Brabazon, pioneer British pilot, will be a 200,000-pound monster transport, says Lord Beaverbrook, charged with civil aviation in England. Although the manufacturer was not named, design work is nearing completion and orders have been placed. With a top speed of 250 mph, the big airliner will carry 50 passengers and 4,000 pounds of mail across the Atlantic in 15 hours. . . . The Army Air Forces has permitted release of the following figures: The AAF now numbers more than 2,300,000 officers and enlisted men. Between Jan. 1st, 1939, and November 30th, 1943, the Training Command produced 100,799 pilots, 18,805 air gunners and 555,891 ground and air combat crew technicians. About 29,000 training planes of all types are in use. . . . The AAF also reveals that 5,000,000 gallons of used aviation engine lubricating oil will be reclaimed in 1944 to be used again in planes operating within the continental limits of the U.S. Oddly enough, about 60 percent of all the oil used by the Army Air Forces is used for training and routine flights here in the U.S. . . . Douglas releases the information that the 5,000th SBD dive-bomber was delivered last November. Grumman has delivered 7,982 combat planes to the U.S. Navy over a two-year period.

ANOTHER TYPE of airplane propulsion system is claimed by Mr. Louis Trosky, Chicago inventor. He claims to have in his laboratory an engine "designed to give 650 mph at 50,000 ft. with only 400 hp. and which will take any fuel from crude oil to lard!" A steam engine, the system is also claimed to be silent, vibrationless, shorten take-off runs to ⅓ their present distance, enable an airplane to climb at an "unheard of" angle and be gotten into production within nine months! . . . An interesting sidelight on the new jet-propelled planes: British reconnaissance planes brought back pictures showing black smudges on certain German airfield runways, the give-away indication of a jay-pee.

Armstrong-Whitworth *Albemarle* Mk. I, new Royal Air Force utility plane. See page 2

The Cat

(Continued from page 17)

The pilots, seeking for holes through the heavy clouds and mists through which to spot their prey, even began using their Cats as dive bombers. When the enemy took refuge at Kiska, the pilots sought them out by diving at unheard of speed—for PBY's—of 250 knots. Forcing the ship's nose down, they would plunge recklessly to the prey, drop their bombs, then pull back on the yoke with the four hands of pilot and co-pilot combined in full strength, to get the ship out of its dive.

The big boats would recover with their long panels flapping like a sea-gull's wings. And no one was more surprised than the pilots themselves that the planes held together. For the *Catalina* had been designed as a long-range patrol ship, not a dive bomber. And no one had ever thought of subjecting it to such stresses as routine.

Cat pilots sometimes worked 20 hours out of the 24 in hunting Jap ships, shore installations, and submarines. At least once they even helped take submarine prisoners. Three PBY's, for instance, having disabled a Jap submarine in joint maneuver, saw five Japs pop out. It called a destroyer to the scene, and when the destroyer finished the sinking with gun fire, it took the Japs aboard.

Most important of all missions were the unsung scouting expeditions that the *Catalinas* maintained regardless of weather conditions for practically 24 hours a day. The Cats would locate the prey; then, when breaks in weather permitted, the Army's bombers and fighters would go out for the kill. Probably such teamwork between Army and Navy flying groups had never before existed. The attacks by Army planes were covered by Cats, so that if any of their pilots went down and landed on the water the seaplanes would have a chance to land on the sea and pick them up. It was a wonderful recipe for maintaining morale.

The *Catalina* work against Jap subs in the far north was duplicated time and again in their sinkings of German subs in the Atlantic and Caribbean. A number of the crews of the destroyed submarines have been rescued. When rough seas prevent landing on the water, crew members of the *Catalina* often drop life rafts, along with emergency rations tied to life jackets.

The success of the airplane—particu-

(Turn to page 49)

The Cat

(Continued from page 48)

larly of the long-range plane like the *Catalina*—in dealing with the submarine menace, was undoubtedly a factor in the Navy's decision to use the long-range Liberator in submarine warfare.

This greater use of Liberators by the Navy has helped make more *Catalinas* available for the vital work of patrol and rescue. Because they can land on the sea, the Cats are performing rescue feats few other planes encompass.

In the South Pacific particularly, where the over-water flights must be very long and many a flier has fallen far from land, the near certainty of being rescued by a Navy plane is one of the greatest sustainers of the human spirit.

The flier who has to come down on one of the lonely atolls of the Pacific may not know how it is the *Catalina* finds him. But he does know he has a better than even chance of being picked up, for it is the talk of every airfield, every encampment. It is estimated that over 60 per cent of those who land, unless they are killed outright by the fall, are rescued. No wonder they love the *Catalina* as they love nothing else that flies.

The rescue work in the South Pacific is divided between the two-passenger *Kingfisher* and the Cats. When there are only one or two survivors sighted, the *Kingfisher* can settle on the water and bring in the stranded without more ado. But frequently there may be from five to forty men, and then the *Catalina* is given the job.

The air rescue service in this South Pacific area is under command of Major Michael Sampas of the Marine Corps, and is based on Guadalcanal. Between April 1 and July 15, the latest period reported, a total of 337 persons were rescued and returned to the United States. Of these, 100 were pilots and crew members who had made crash landings or had parachuted to safety. Many of them were rescued right under the noses of the Japs.

Major Sampas, now 32 years old, has personally conducted many of the rescue flights in a *Catalina* and received the personal commendation of Admiral William F. Halsey for his work in organizing the air rescue service.

When pilots are reported down on the outlying waters, the radio call comes in code, to rescue duty.

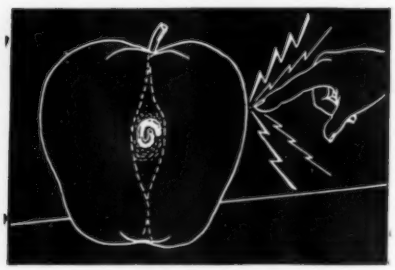
The big Cat, dozing on the water, lifts itself slowly, then tears off with throttles wide open, to keep up with the fighter planes that usually accompany a rescue mission into the fringe of Jap-held territory.

A trained aviator is a precious being, and his rescue is as much a cause for rejoicing as the return of the lost sheep of the Scriptures. Not only does he represent an investment of $25,000 to $30,000 in money. More important, once he has gone through combat, the experience he has gained has given him training that money cannot buy.

After the dangerous and exciting work of picking up airmen survivors following an engagement, the Cats will often reconnoiter all the nearby beaches for days thereafter. Many an aviator has been shot down. The PBY's even have helped in ambulance work when the regular ambulance plane facilities were hard pressed.

"Everybody loves a Navy PBY pilot," the saying goes in the Solomons. They are the most popular men in the battle areas, because of their rescues, and their

(Turn to page 50)



The Cat

(Continued from page 49)

fellow Naval airmen, Army, Marine and New Zealand pilots, consider them pals.

The Japanese consider their fallen flier expendable; they make no effort to rescue them. Our own policy has been to do everything possible to bring back a survivor. As a result United Nations pilots fight harder, fly far out to sea whenever necessary, knowing no effort will be spared to pull them out of trouble.

In jobs like these the Cat has kept doggedly on, performing thousands of missions that were always emergencies. It may still just be an old duck. But to the men who love it, it sings.

The Cat was born in Buffalo, New York, in the Spring of 1935, the last Consolidated airplane to be produced there, moving operations for San Diego, Calif., going on at the time the XP3Y-1, as it was known, was being completed. A revolution in flying boat design, the XP3Y-1 was the first flying boat in the world to incorporate retractable floats, integral fuel tanks, stressed skin wing, double row radial engines, constant speed propellers and full cantilever empennage. It made its debut in the Navy with an international record-smashing flight on October 14th and 15th, 1935, from Cristobal Harbor, Canal Zone to San Francisco Bay, California, a non-stop distance of 3,281 miles. Lt. Comdr. Knefler McGinnis was in charge of the flight.

Consolidated XP3Y-1 riding at anchor after completing Panama-'Frisco record flight

The Navy ordered production quantities of the PBY-1, substantially the XP3Y-1 with revised rudder and minor internal modifications. In 1937 a total of 60 PBY-1's were delivered. This original version, many of which are still in service after eight years of hard work, has a wing span of 100 feet and is 65 ft. 1 in. in length. Weighing 27,400 pounds fully loaded, it is powered by two P & W Twin Wasp R-1830 engines, which develop 1,050 horsepower each. Top speed is 200 miles per hour and the PBY-1 cruises at 180 for a total range of 4,000 miles. The PBY-2 and PBY-3 are essentially the same airplane, 50 of the former and 60 of the latter being delivered in 1938 and 1939.

The design was enlarged slightly in the PBY-4 version with the span increased to 104 ft., the weight to 30,000 lbs. and the length to 68 ft. The over-all height was increased 8 in. Larger P & W engines, of the same type, were fitted with horsepower increased to 1,200 ea. A total of 33 PBY-4's were delivered in 1940. The PBY-5 model featured the installation of fully enclosed waist gun positions and 200 were ordered on December 20th, 1939. Deliveries began in 1941 and subsequent contracts were signed. A special amphibian version of the PBY-5, known as the PBY-5a, was perfected in 1938 and contracts for 135 of the type were signed in November, 1940, with deliveries commencing shortly thereafter. Thus more than five hundred Cats have been delivered to the United States Navy. Quantity orders for various models have also been filled for Britain, Australia and the Netherlands.

In addition to production in San Diego, Cats are also being produced in Canada by Boeing Aircraft and in Philadelphia by the Naval Aircraft Factory where they are known as PBN-1's. This latter version has been modified with a sharp bow, extended rear step and a higher and more rectangular vertical stabilizer and rudder.

All Cats have been equipped with reversible-pitch propellers, useful in maneuvering on water in restricted areas. The rate-of-climb in earlier models is 920 ft./min. but this has been increased to 1,000 ft./min. in later models. Service ceiling is about 25,000 feet. The Cats carry either two torpedoes or about 4,000 lbs. of bombs or depth charges, all carried externally under the wing.

A special engine-exhaust anti-icing system has ben experimented with on the Cat. This system consists, simply, of routing the engine exhaust out along ducts located in the leading edge of the wing and the tail surfaces. Heated by this hot exhaust, the surfaces combat ice formations efficiently.

Reports of "special devices" being fitted to the Cats in the Pacific theater have been received and these mechanisms have given the plane a greater amount of offensive power than included in the past. The Navy has evinced a new interest in the Cat so equipped and there is every likelihood that the Consolidated Cat has lots of glory yet to claim in this war.

(We are indebted to Messrs. Hill and Knowlton, New York City, for portions of the material contained in the above article—Editor.)

VICTORY

WARPLANES!
See page 62

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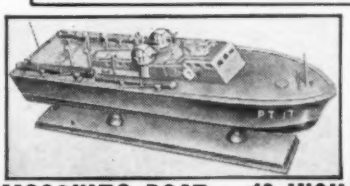

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Air Ways

(Continued from page 30)

Pfc. LeRoy S. Hubbard, SAACC 28th Avn. Sqd. (Sep.), San Antonio, Texas, sends in Picture No. 3 of his exhibition Lockheed *Hudson* reconnaissance-bomber. Although purchased in kit form, LeRoy has done considerable extra work in planking the fuselage and in accuracy of details. He says that this is only his second model and at this rate of progress, LeRoy should become one of the best in a few years. His next project is a Lockheed *Lightning*, which we shall certainly anticipate.

Picture No. 4 illustrates what is probably one of the finest examples of model aircraft construction yet achieved. It shows the uncovered structure of a Noorduyn *Norseman*, the expert work of J. S. Luck, 7 Chester Ave., Mount Royal, Montreal, Canada. Known in the U. S. Army Air Forces as the UC-64, the *Norseman* is a general purpose small transport and cargo plane which was used effectively on the Alaska Highway project and is the only Canadian designed and manufactured plane. The scale of the model is 1-1/2" to the foot, giving a wing span of 77", or well over 6 ft. The estimated flying weight is 85 ounces (more than 5 lbs.) and the estimated wing loading is 12.7 oz./sq. in. The airfoil is a "Davis Wing" plotted to an Fc of .089 for low speed. The motor is either an Ohlsson "23" or a Brown "60" as shown in the photograph. The purpose of this model is non-competitive flying, the idea being to design and build an accurate flying scale model suitable for long flights under power. Although Luck gives no details he claims "automatic" aileron and elevator control which makes it possible to adhere to the actual dihedral used on the large ship. Truly an amazing construction performance and one of which we are quite proud. We anticipate publishing a great deal more of Mr. Luck's work in the very near future.

Picture No. 5 shows a Varsity adapted for control line flying by Charles Daniel, 420 N. Spruce, Albuquerque, New Mexico. This is Charlie's first gas job but it has proved a success with more than a dozen satisfactory flights. His father is a Commander in the U. S. Navy in the South Pacific.

An interesting story comes from Lt. Gilbert W. Schwartz, Station Hospital, Army Air Base, Richmond, Va., whose Republic P-47 *Thunderbolt* appears in Picture No. 6. He says: "The plane was constructed by myself with the technical advice and assistance of Lieut. James W. Thompson (pilot) and Melvin Kleinfelter, civilian mechanic at the Base, and my wife, who did the drafting and painting. The materials were obtained from the salvage pile of wrecked planes, a few shirt cardboards and whatever balsa wood and covering tissue was purchasable in town. The paint was 'graciously contributed' by the Base paint shop. The design was put down by Lieut. Thompson and Mr. Kleinfelter, who fly and repair these ships. When the rough draft was completed (after much discussion and field observation by the three men) my wife unlimbered her drafting instruments and drew up the plans on shelving paper. Many a busy evening was spent around the dining room table, happily insulting one another's knowledge of aerodynamics. Mrs. Brooks, our landlady, graciously allowed us to desecrate the whiteness of her table cover. (We subsequently bought her a new one.)

"When the ship was to be painted and my wife was called upon to employ her artistry, she was invariably engrossed in painting her fingernails and was led, protestingly, to the dining room!

"The overall cost, complete with guns, pilot tube, intercoolers, oil coolers, supercharger, etc., was a scant 45c!"

Picture No. 7 is of a Westland *Lysander* built by Fred L. Patterson, 1115 Elliot St., Saskatoon, Saskatchewan, Canada. Built from plans appearing in MODEL AIRPLANE NEWS, the plane has been re-worked since the picture was taken and now features the small bomb supports so well known on the full scale *Lysander* landing gear. In his letter, Fred states that Canadian model kits hardly compare with American kits in the quantity of materials and parts included, although he does not state whether this condition has existed only since the war.

One of the most beautiful photographs we have ever published is Picture No. 8 showing the Waco Custom C-6 built by Andrew S. Briner, 65-1/2 High St., Houlton, Maine. Although the model itself is an exceptional example of fidelity to detail in scale model construction, the accuracy and skill utilized in making the photograph has enhanced the model to the fine appearance shown in the photograph. We cannot stress too highly the value of good, professional photography in model pictures, and here is a very detail example of what the results can mean when the camera is correctly handled. Regarding the model, Andy says: "It has a completely detailed cabin interior, upholstered seats, dome light, control column and rudder pedals, parking brake, fire extinguisher, cabin door and baggage compartment door, both of which open and close. The engine is a complete replica of the seven cylinder Jacobs used in the big ship. The entire model is a shiny black. The stripe on the fuselage sides and on the pants is green, trimmed in a white pin stripe. The 'Firestone' trade mark is also lettered on the tires." We cannot praise such scientific effort too highly and from the photograph and Andy's description, here is a truly exceptional example of the scale model airplane builder's art!

Picture No. 9 compares equally with the model mentioned above and we see here just how a little extra care in the photographing of the model would have enhanced its appearance enormously. It is a detail scale model of a Curtiss P-40C *Tomahawk* by J. A. Barlow, 939 E. Olive Ave., Colton, Calif., a civilian mechanic with the Army Air Forces at the San Bernardino Air Depot. An all-out scale model fan, Mr. Barlow, in his letter, pleads for more and more of such detail scale drawings as those of our Staff Draftsman, William A. Wylam, and we certainly agree with him when he says that MODEL AIRPLANE NEWS' own Bill Wylam is the finest in the world. (For another Wylam detail layout plan, see page 21 of this issue.) Of his model, Mr. Barlow says: "It is quite complete with controls movable from the cockpit, retracting main landing gear, retracting full swivel tail wheel, sliding hatch, lights that turn on from a tiny switch on the dash board (There's one, fellas!), scale pilot's seat and cockpit details including the throttle quadrant, magneto switch, starter pedal, hydraulic hand pump, landing gear and flap controls, trim tab controls, command set radio, electric gun sight and a map located in the map case!" Boy, what we wouldn't give to get a look at a model like this one!

In our February, 1944, issue we printed

having pioneered the popular Model Aircraft League, and supported all sectional contests held in the past two years. However, the primary purpose of the club is to afford recreational activity for Norcrafters. To attract all modelers, the club will enter into activities for builders of each of the four type models. This includes the gasoline powered models, rubber powered models, gliders, and scale models. The scale model builders, including juniors, will be pleased to learn that plans are already being developed by the N.R.C. to have a contest in the near future.

In connection with the expansion program Paul Sowles announces the appointment of assistants in the Main and Crenshaw plants and is seeking assistants in the other plants and other shifts. On days Tom Laurie, Department 20, is to head the Crenshaw group, and Vic Leroux, Department 27, and L. O. Hard, Department 52, to head the assembly side and fabrication sides, respectively, of the Main Plant. Dan Kilgore, Department 20, Liaison, will captain the second shift of the Main Plant.

Even if the EAST BAY AERONEERS are unable to fly their gas models, as there is no available field, the Club is sticking together, and I mean "sticking," according to reports of Don Foote, Russ Watkins, Paul Romak and Chas. Hubbard, working on their first microfilm models.

The E.B.A. held a Microfilm Contest in the gym after the meeting on Monday night, Jan. 17. As there was no entrance fee, and merchandise for prizes, it encouraged the boys to build. If others could have "peeked-in" on Don, Russ and Paul—up to their necks, probably, in the bath tub, plus micro-film, it must have been a "sight" and funny. Don and Russ had a nice-looking "black" model, looked as if it had been on fire. When Don was questioned, he said, "Sure, it was on fire." He said no more.

There was one expert microfilm builder in our midst, Bud Cope. He flew at the Nationals and is good. He had several beautiful models which gave the Club a good idea of what they have to fly against. The gym was too small for very large models. At least this is a beginning for the Aeroneers in microfilm; the results are very funny, but here they are:

1. Bud Cope—3:21
2. Jack Dyer—2:39
3. Bud Cope—2:18
4. Barney Tesche—1:32
5. Russ Watkins—1:31½
6. Campbell—6 seconds
7. Dickey—5⅗ seconds
8. Carleson—2 seconds
9. Herb Hollander, 1½ seconds
10. Jack Burke (crackup)

Here are the results of the 15th semi-annual gas model airplane contest of the G.M.A.A.S.C. The club's own model airport at Western and Rosecrans was "wet" from "fog" and the contest had to be held at Vail Field, Los Angeles, California. There were 500 spectators and 106 entries. Trophies and bonds for the first three places in each of Class "A," "B" and "C," plus trophies for longest flight, greatest number of points, appearance, junior and A.M.A. models. Ray Acord, president-elect of the club, was Contest Director. No restrictions as to weight (either wing or power loading) were required. A 20-second motor run prevailed. Three hundred dollars in War Bonds were awarded with the trophies.

(See next page for results)

a beautiful photograph of a beautiful model, Jess Larsen's Ryan PT-20. Well, the Ryan seaplane shown in Picture No. 10 is all a part of the same story, and here's how its builder, Sherman Schultz, Jr., 288 So. Saratoga, St. Paul, Minnesota, tells it: "The two models were built 1900 miles apart by two boys who went to high school together and then separated upon graduation. We have seen each other occasionally during the 3½ years since graduation and have kept up a steady correspondence. The Ryan I built (the seaplane shown in Picture No. 10) was the first of the two and was completed in 1942. After pictures and encouragement, Jess went ahead and built one, too. His has more detail than the seaplane and a finer finish." (We might argue about that, Sherman!)

CLUB NEWS

California

Threefold expansion of the NORTHROP MODEL CLUB is the announced aim of Commissioner Paul Sowles in preparing the program for the spring season. Northrop workers and Northrop juniors are urged to join now in the model activity. The N.R.C. Model Airplane club is one of the three leading model organizations in the Los Angeles area

CLASS A

Place	Name	2 Flight Total
1.	Ray Acord	8:16
2.	Milton Ronney	8:15
3.	Bill Butler	5:45

CLASS B

1.	Harold Viault	8:35
2.	Allen Trainor	8:00
3.	Richard Reese	7:57

CLASS C

1.	Bill Creany	9:33
2.	Bob Gunzel	8:44
3.	Frank Cummings	8:21

Junior Trophy: Richard Reese
Sweepstakes: Ray Acord
A.M.A. Trophy: Bill Creany
Douglas Longest Flight Trophy: Bob Gunzel
Northrop Triple Win Trophy: Won for 3rd time by G.M.A.A.S.C.
Appearance Trophy: Frank Cummings

Texas

Second Annual Dallas City Championship Control-Line Contest

This meet, sponsored by the DALLAS GAS MODEL ASSOCIATION and the Dallas Exchange Club, was held at Fair Park, the Texas State Fair Grounds, in Dallas. Flights were made on the softball diamonds, with the spectators safe and comfortable in grandstands behind a wire fence. The stands were packed all day with a very enthusiastic crowd. Highlight of the day from the spectators' standpoint was a dog-fight between two ships flown by George Tucker and Johnny Clemens.

The acrobatics and slow-speed events had to be cancelled because of lack of time. These events will be made into a special contest at some future date.

The results of the meet were as follows:

Speed Events—Class A-B (up to .3 cu. in.)
1st—Jim Bill Clem—62.5 mph
Class C qualifying over 70 mph
1st—Don Currey—85 mph
2nd—Joel Hargis—79 mph
Class C qualifying 70 mph or under
1st—George Tucker—70 mph
2nd—Jack Conly—67 mph
3rd—Eddie Kindelberger—63 mph
4th—Bob Crenshaw—63 mph

Spot Landing
1st—Jimmy Dugger
2nd—Raymond Hubbard
3rd—Leland Morton

VICTORY

Boeing Aircraft Company's *Enginairs*, code company model club, meets monthly

SKY WRITERS

METEOROLOGY by W. J. D. Allan and William Alexander. Chemical Publishing Co., Brooklyn, N. Y. $1.50

Part of a series known as the Observer's Handbook, this volume has been written by two Royal Air Force ground instructors in pre-flight training. Almost pocket-size, it is a complete and very simply presented discourse on the fundamentals of the subject including the atmosphere, the weather map, wind, clouds, polar front theory, types of pressure distribution, fog and ice and the altimeter. A handy reference and particularly valuable for the student interested in fundamentals.

ABC OF GLIDING AND SAILFLYING by Victor W. Page. Norman W. Henley Publishing Co., New York City. $1.50.

As one would gather from its title, this volume was written some time ago and, although some of its terminology and illustrations are rather old, the beauty and pure science of gliding and soaring are ageless and in this respect this book is interesting and highly instructive. Gliding is normally accompanied by a continuous loss of altitude whereas soaring indicates the use of thermals to gain altitude. Technically the difference lies in the design of the craft, the glider normally being of a rough, open framework, the high-performance soarer being a beautiful cabin plane with exceedingly high aspect ratio. The book is full of 3-view drawings of various gliders and forms a more or less historical account of the science. Plans and instructions are contained from which a glider may be built and flown.

MATHEMATICS FOR ENGINEERS by Raymond W. Dull. McGraw-Hill Book Company, New York City. $5.00.

Among the engineering fraternity "Dull's Mathematics" has become standard as a ready reference work and most particularly as a quick analysis of a particular mathematical operation. Frequently engineering problems arise involving a specific mathematic function which, while vaguely familiar to the engineer, is not quite clear as to exact procedure. In a single paragraph, such a method is available and, in this respect, this book is invaluable. It is difficult to include, in a short review, even an approximation of the vast scope of this huge (780 pages which proceeds from such fundamentals as addition and subtraction to partial and multiple integration. The book is full of "tricks" and amazing short-cuts so useful to the stress man or calculator who must perform a long series of identical operations. Written specifically for the engineer, it is a basic part of the engineer's reference library.

WHY MEN CAN FLY by M. K. Chapin. Reynal and Hitchcock, New York City. $2.50.

Aeronautical engineers are always greatly embarrassed by a woman with a knowledge of their science and are completely maddened at a woman who is a complete authority on the subject and in this respect Miss Chapin will make lots of us angry. She is, indeed, an authority on every facet of the aviation subject and, in addition, has a masterfully simple and lucid style which carries the reader through a difficult subject before he has

time to prepare himself for its complicacy. In describing this book, one might think of it as a history, another as a text book, still another as a popular novel. Miss Chapin has skillfully woven into its 338 pages all of the basic elements of these three skills and the product is an absorbing answer to the equally absorbing question: "Why Can Man Fly!" We might add that "how" is the real explanation contained in this book.

THE AMERICAN STUDENT FLYER by Hamburg and Tweney. Pitman Publishing Corp., New York City. $1.50.

When the writer went to school it was not until his third year in college that he was introduced to the elements of aeronautics and now along comes this book written expressly for the high school student to be used as a text book for a course in aviation. Had such a book been available ten years ago thousands of today's engineers might have saved themselves four years of hard work. Written expressly for the knowledge and technical capacity of the high school student, Mr. Hamburg, of the Detroit Public Schools and Mr. Tweney, of the University of Detroit, have collaborated on a monumental task and the results are quite satisfactory. A huge book, its 692 pages are worth easily 10 times what it costs, and very rarely is the *complete* subject matter of all the possible aspects of aviation, contained in a single volume.

AIR NAVIGATION (Parts I and II). Chemical Publishing Co., Brooklyn, N.Y. $2.50 each.

Part of the huge Aeroplane Maintenance and Operation Series, undertaken for the British Royal Air Force training program, these two volumes, available separately or together, are compact and thorough analyses of the problems of getting an airplane where it's going. This is, indeed, a more complex problem than the layman might believe and it is only after a thorough study of such topics as air pilotage and dead reckoning, maps and charts, astronomical and radio navigation and meteorology (Vol. I) and magnetic compasses, direction indicators, calculators, drift sights, radio beams, range finding and night flying (Vol. II) that the modern flyer can successfully accomplish so important a task.

FROM BIRD CAGE TO BATTLEPLANE by Ralph Michaelis. Thomas Y. Crowell Co., New York City. $2.75.

The youthfulness of aviation, its participants, accomplishments and adventures has precluded a real history of the subject until recently when some 40 years became available for study. In terms of other sciences, this is but a few years, and aviation is frequently regarded as the baby of the industries. But 40 years of flying and fighting have given the artist the tools with which to paint a picture of its past heartbreaks and achievements. And now comes this sorely needed history of the Royal Air Force by a man who should know it, for he has been intimately connected with it almost since its inception as the Royal Flying Corps. Mr. Michaelis has penned a mighty his-

tory of this equally mighty arm, without which Germany might, today, hold the entire world in its grasp. From the first Sopwith Tabloid biplanes (unarmed) which sailed against the Germans in 1914 to today's mighty Manchesters and Sterlings, the complete story is told, in both text and pictures, of one of the most romantic military arms of the entire story of fighting.

TRAIL BLAZING IN THE SKIES by Shafto Dene. The Goodyear Tire and Rubber Company.

The story of lighter than air development has been so involved with politics, tragedies and disappointments that it is difficult to weed out the truly amazing technological advancements made in this science through the years from the many failures which were in no wise a result of errors in design or construction. The Goodyear Tire and Rubber Company, America's pioneer lighter than aircraft designers and builders, have prepared this story from the viewpoint of the true success of this type of aerial locomotion, and has managed, somehow, to interweave the science with a beauty that is miraculous. Completely illustrated, it is an historical account of the development of the science from which one would gather that its possibilities, rather than having been exhausted, as many of our leaders would have us believe, have only been touched. It is the only book of which we know, devoted exclusively to lighter-than-air development and in this respect it is an invaluable addition to the aviation enthusiasts bookshelf.

SEMPER FIDELIS by Keith Ayling. Houghton Mifflin Co., Boston, Mass. $2.00.

The sub-title of this grand book: "The U. S. Marines in Action" sums up its contents and almost completely describes the power, beauty and great faith in a tradition that the stories contained herein tell. Few books on any aspect of warfare contain the real, inside story of individual valor and esprit de corps that this one does and certainly no book devoted exclusively to the Marines, of which this is the only one of which we have heard. Combing the official accounts, Mr. Ayling has selected and amplified the courage, strength and skill of the modern marine and *Semper Fidelis* is action adventure such as only true stories can give us.

YOUNG AMERICA'S AVIATION ANNUAL—1944 by David C. Cooke. Robert M. McBride, New York City. $2.50.

Designed and written for youth in aviation, this fourth issue of the series contains chapters on airpower, the Army Air Forces, Naval Aviation, military air transport, fundamentals of air fighting, the North African campaign and the manufacturing industry. It is well illustrated with late official Army and Navy photographs and contains a complete account of the 1943 activities of the various services mentioned. It is a compact account of 1943 aviation progress for the younger reader and serves to keep this age group abreast of the aeronautical times.

VICTORY

Have You Your Copy of
"MODEL AIRPLANE DESIGN AND THEORY OF FLIGHT"?
See page 47

ADVISORY BOARD

Question: What is microfilm?

Answer: Microfilm is an extremely thin sheet of nitrocellulose material used for covering indoor models. Its thickness is approximately 1/10,000 of an inch. It is made by dropping a small amount of banana oil or nitrocellulose liquid on the smooth surface of water. When it strikes the water it immediately spreads out over the surface, covering it with a thin film of nitrocellulose material. This hardens quickly forming a sheet of microfilm. It is lifted carefully from the water by placing a wire loop beneath it and raising carefully with a sweeping sideways motion so that part of the film leaves the water first and the balance progressively. It is not lifted vertically from the water because the water suction will break it. It is applied to the frame of a plane by placing the frame on the film within the wire circle. The film is then pressed tightly to the wood and the film-covered frame is cut away from the wire loop.

Probably the one factor which causes more trouble than any other when flying a model is the wing's position and angle. Harvard Schuler of 2473 Beals Avenue, Detroit, Michigan has found this to be true. He says, "I have always had difficulty in placing the wing in the proper place for good flights, especially on commercial planes." He asks:

Question: Is there a rule or formula for determining correct wing position for proper flight?

Answer: Yes. There is one basic rule that applies to average models and from which variations are made for particular types. First, in respect to the wing's fore and aft position: place the wing so the model balances in a horizontal position at a point 1/3 the wing chord back from the leading edge. If the wing is 3" from leading to trailing edge the wing is placed so the airplane balances at a point 1" back of the leading edge. Second, when the wing is in this position the angle of incidence—that is, wing angle relative to the thrust line (centerline of propeller shaft) is 2-1/2°. If the leading edge is raised 1/8" when the chord is 3" the angle of incidence is approximately 2-1/2°.

Whether or not the model makes a good flight with this setting also depends upon the stabilizer. With such a wing setting the stabilizer is set parallel to the thrust line, or about 1/2° negative; that is, the leading edge is lowered 1/64" when the chord is 2". With the stabilizer set neutral parallel to the thrust line, the wing setting described may possibly cause a slight nosing down effect, or at least provide little climb. Often the wing must be moved forward slightly for proper adjustment. In other words, the setting given is the maximum rearward position.

In some cases the wing must be moved forward so the plane balances at the chord mid-point; if the chord is 3" this is at 1-1/2" from the leading edge. When you have definitely set the wing and stabilizer angles the stab.'s position should be shifted forward or back, determined from tests, in order to obtain the correct setting. Stabilizer angle has a great deal to do with the wing position. If the stabilizer is slightly positive usually the airplane's point of balance or center of gravity is located at the chord mid-point.

There is one exception to this, namely, low-wing airplanes. In this type the wing is set so the c.g. is at its mid-point and the angle of incidence equal to 0°.

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The stabilizer is set at —2°. This results from the effect of the high thrust line, tending to nose over the plane and lift the tail, giving the effect of a positive stabilizer. Consequently a negative stabilizer is used to neutralize this condition.

E. G. Hutchinson of 442 S. Newlin Avenue, Whittier, Calif., is building a rubber powered speed model. He says requirements for his latest job are that it must rise from the ground and fly a 176 ft. course in less than 2 seconds. But when flown it rose from the ground nicely but spiralled in either to one side or the other when only part of the course was covered. The model is a gull-wing fuselage plane, the wing protruding from the fuselage centerline passing up and sideways at 60° to a point on the level with the fuselage top. Then each wing protrudes sideways at a dihedral angle of 2" and 10-1/2". He asks:

Question: Why does my model perform in this manner?

Answer: The circumstances in this case are similar to those confronting the builder mentioned in the first part of this article. Unfortunately Mr. Hutchinson has selected the wrong type airplane for a speed model, namely a high-wing plane; speed models in most cases should be low-wing airplanes. Second, the cause of this disappointing maneuver is probably due to too little fin area. On speed planes great power is used to obtain speed. This in turn produces extreme propeller gyroscopic effect that swings the tail one way or the other. Consequently, larger fin area must be used on speed models than ordinarily.

A larger fin corrects the sideways spiral. However, because it is a high-wing it has a tendency to nose in and dive at the end of the flight unless the angle between wing and stabilizer is so slight it will be unstable longitudinally. That is, it will either nose up or nose down without recovering.

In order to use a difference in angle between wing and stabilizer of at least 2° the airplane must be the low-wing type for the reason described in answer to Mr. Schuler's question. Low wings have a tendency to nose upward at the end of a flight rather than dive in. This allows the airplane to climb slowly at a gentle angle, fly level close to the ground and nose upward into a three point landing when the power is expended. The nosing up tendency is due to cessation of propeller thrust. When the propeller is pulling, the thrust line is above the centerline of resistance in the model, causing a nosing over effect. When the model is adjusted to fly level under these conditions it has a tendency to nose up when the thrust dies. This is a peculiarity of all low-wing models and is used to good effect in speed jobs.

Don't forget, send us your questions!

Ray Rusher of 4415 No. Troy Street, Chicago, Ill., has difficulty not in flying but in building his model. He asks:

Question: Is it feasible to cover models with cellophane to show internal details? If so, what adhesive is used?

Answer: Yes. Models can be covered with cellophane; in fact, this material is often used. Care should be taken in selecting the weight or thickness of the cellophane to conform with your model's weight. The best adhesive is regular airplane quick-drying cement composed of a nitrocellulose base.

VICTORY

The Air Ager

(Continued from page 9)

build the right panel (the left one is drawn), simply reverse the leading and trailing edges. In other words, put the outside of the leading edge along the curve defining the outside extremity of the trailing edge. Reverse the trailing edge, spars, ribs, and wing tip formers in the same way. The ribs are countersunk in the trailing edge for additional strength. Also small gussets glued between the ribs and the trailing edge help to make this part of the wing more rigid. Be sure that there are no warps in the wing halves when through making them. To join the panels, set the center ribs at the necessary angle to produce the correct wing-tip elevation. Smear the outside faces of these ribs with glue, press together. The wings should be blocked up to get the right dihedral. Insert the dihedral braces, and set aside to dry. When the cement has set, the mid-section of the wing should be planked, top and bottom. The wing platform should now be built. Use 2" wide sheet balsa. Cut out the various sections that make up the platform. Note that the grain of the balsa is at right angles to the wing pylon, so that if the sheet balsa is 2" wide, four sections will be needed to make the platform equal to wing-root chord, which is 8". Glue the platform pieces tightly together, and let dry thoroughly. When dry, draw the center line of the platform on the balsa. Run a knife or a razor blade over this line several times, but only with enough pressure so that it makes a cut half way through the balsa (which is 1/8" thick). Now put the platform on a table or thick book, so that the heavily scored center line of the platform coincides with the edge of the table or book. The scored line should be facing upwards. Hold one side of the platform securely, and push down on the side projecting over the table. To get the correct angle in the platform, cover the bottom mid-section of the wing with wax paper, and place the platform over this, bending it so it conforms with the angle formed by the bottom of the wing.

Pin the platform to the wing, and fill the center line up with glue. As soon as the platform's dihedral angle has set, remove it from the wing, and set it on the pylon, with the center line of the platform bisecting the top of the pylon. Use plenty of glue, and be sure that the obtuse angles formed by the under surfaces of the platform and the sides of the pylon, are equal. When the platform has cemented itself strongly to the top of the pylon, the joint may be strengthened, and at the same time faired, by the use of a thick mixture of balsa dust and glue.

Tail Surfaces

The stabilizer platform, as is the wing's, is elliptical. Cut out and shape the leading and trailing edges, pin them to the plans (which should be protected by wax paper), and insert the spars and wing tip pieces. Cover the "V" made by the two center ribs of the stabilizer, on the bottom side only, with 1/16" sheet balsa. Attach the "stabilizer fairing former" to the leading edge. The fin is made separately from the stabilizer and then mounted on it, with the projecting spar of the fin glued against the spar of the stabilizer. The trailing edge of the fin is glued in a butt-joint, and perpendicular, to the trailing edge of the stabilizer. The leading edge of the fin is led down, and glued against the stabilizer fairing former. Be sure that the fin is perpendicular to the stabilizer before the glue sets. The rudder is made from 3/16" sheet, shaped, sanded and then attached to the trailing edge of the fin by means of paper or soft metal hinges.

Landing Gear

The Air Ager's landing gear is of the proved, conventional type, and is easly removable for straightening, or in case the model is to be shipped somewhere. Use 1/8" diameter steel music wire, and bend to the shape shown on the plans. The wire itself is held to the firewall by aluminum, tin, or brass sheet, which is bent to the shape of clips, clipped over the "U" bend of the landing gear, and then bolted to the firewall. It may be convenient to use one of these bolts as the plus connection for your "boosters." Either balsa or rubber tires may be used. A thin strip of wire should be glued along the bottom of the lower fin to protect it from bruising under hard landings.

Covering

The covering on the Air Ager was Silkspan, doped and then color-doped red and gray. Later it was found that this added much too much weight to the model, and the wings were re-covered. To avoid this error use either colored Silkspan or white paper and then trim it. Cover the fuselage sides first, then the top and bottom, including the lower fin. The empennage should next be covered. Start with the upper surface of the stabilizer, one-half at a time. Dope the wet Silkspan to one of the ribs that forms part of the "V," and over which the fin is located. Dope the other end of the piece of wet paper to the tip of the stabilizer, and tack it along the leading and trailing edges of the panel, and pull out all the wrinkles. Repeat this process for the other half of the stabilizer. The bottom should be covered with one piece of paper. Give all the covering on the stabilizer three coats of dope before papering the fin. To cover the fin, dope the wet Silkspan onto the covering on the top of the stabilizer, just out-board of the middle ribs forming the "V." Then

(Turn to page 62)

The Air Ager

(Continued from preceding page)

tack with dope the covering to the tip, leading and trailing edges of the fin and to the side of the stabilizer fairing former. Pull out the wrinkles and repeat the procedure for the other side of the fin. If done properly, the result will be a beautiful fairing job that adds so much to a model's looks.

The wings are covered in the conventional manner. Again, watch most carefully for warps, and if any should set in, immediately and permanently correct them. There is no need of "wash-in" in the left wing (from the pilot's position) to counteract the engine torque, as the wing area is sufficiently large to overcome this by itself. Striping may be done on the wings and fuselage, in which case masking tape should be used.

Cowling

Only after the model has been thoroughly test-flown should the cowling be put on. To make the cowling, use the outline given in the plans, and then cut openings in it suitable for your own motor. The inside of the cowling should be color or clear doped several times before the cowl is attached permanently. Make the cowl from heavy paper (Manila), light cardboard, or bristol board.

Adjustments and Flying

For her first flight, take the Air Ager out on a calm day, preferably in the early morning or in the evening. Launch the model, on its test and adjustment glides, about four feet from the ground, and into the wind, if any. Use the rudder to adjust the direction of the model. Very little deviation of the rudder from its true position is needed, because of the long tail moment arm. If the wings have developed any small warps that can be eliminated by the use of a small tab on the left wing, employ such a tab; but if the warp or warps are large, you had better correct it by steaming or re-covering the whole wing. To adjust the center of gravity, the coil and pen cells may be shifted backwards or forwards along the ignition track. There should be no need of any negative or side thrust on the Air Ager and before flying check the engine to see that it is set at 0-0-0 (no side, up, or down thrust). The angles of incidence of the wing and stabilizer may be varied by slipping small pieces of strip balsa under the leading or trailing edges, as may be necessary. When first flying the Air Ager, do not open the motor all the way out, as she has a very steep climb, and if maladjusted, will crash fearfully. Rather, throttle the engine down, and let her take off from the ground, or if this is impossible, launch her gently into the wind. Be sure that at the moment of launching, the wings are held level, and the nose is not pointed upwards.

If built correctly, the construction of the Air Ager is very strong, as the author has found out. When test flown, the model had some very bad crashes, one after another, due to faulty design in the location of the center of gravity, and warps in the wings. However, she pulled through and proved her design's worthiness in spite of all obstacles. The builder of the Air Ager will have great fun in constructing her and flying her, because the model has proved she can take it, and dish it out, too.

VICTORY

WHAT DO YOU LIKE BEST IN THIS ISSUE?

We are anxious to publish the features *you* want to read. Drop the Editor a line.

THE WORLD'S TWELVE FASTEST

According to Peter G. Masefield, well-known English aviation authority, here are the twelve fastest airplanes in the world. The list is based on available data; obviously new and secret machines, or modifications of existing types still on the restricted list, are not included.

1. Messerschmitt Me 109R (World Speed Record; 481.4 mph on April 27, 1939).
2. Heinkel He 112U (World Speed Record; 463.9 mph on March 30, 1939).
3. Macchi-Castoldi M.S. 72 (World Speed Record; 440.7 mph on Oct. 23, 1934).
4. Hawker *Typhoon* (Standard single-seat fighter).
5. Supermarine S-6B (World Speed Record; 407 mph on Sept. 29, 1931).
6. Republic *Thunderbolt* P-47 (About 400 mph; in service 1942).
7. Messerschmitt Me 210 (About 385 mph; in service, 1942).
8. Focke-Wulf Fw 190 (About 380 mph; in service, 1941).
9. Messerschmitt Me 109F4 (About 375 mph; in service, 1941).
10. Supermarine *Spitfire* Va (About 370 mph; in service, 1941).
11. Lockheed *Lightning* P-38 (About 370 mph; in service, 1941).
12. North American *Mustang* P-51 (About 370 mph; in service, 1941).

The fact that this list is obviously based on published speeds has led Mr. Masefield astray, although he could not very well have quoted speeds based on confidential information. Also, in most cases, the speeds quoted are based on earlier models than are now in existence. Certainly there is no argument concerning the first two mentioned and 481.4 mph is accepted as the fastest level speed ever attained by any form of conveyance. However, we are quite certain our *Lightning* and, most assuredly, our *Mustang* are considerably faster than 370 mph. It is interesting to note the *Typhoon's* maximum speed, although not specifically stated, is nested in between 407 mph and 440.7 mph. Although this is a fairly wide range, it is assumed the British Air Ministry has officially released information leading to Mr. Masefield's placement of the *Typhoon*. (It might be noted the *Typhoon's* engine develops 2,400 hp, or about 20% more than any American engine now in service.)

Personally, we are quite confident the latest North American *Mustang*, powered by a Packard-built Rolls-Royce *Merlin* engine developing about 1,600 hp and capable of 40,000 ft. altitude, would have the edge over other service machines, including the *Typhoon*.

VICTORY

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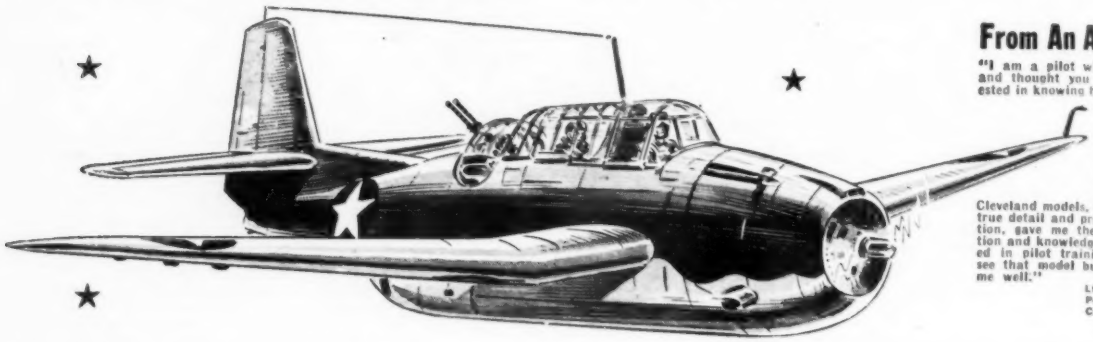

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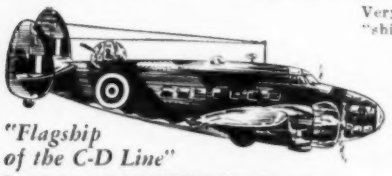

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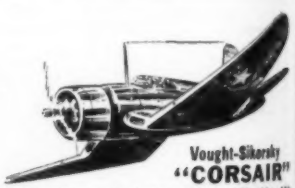

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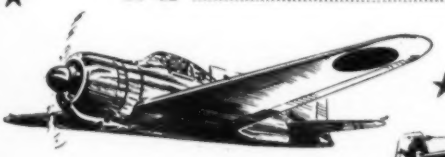

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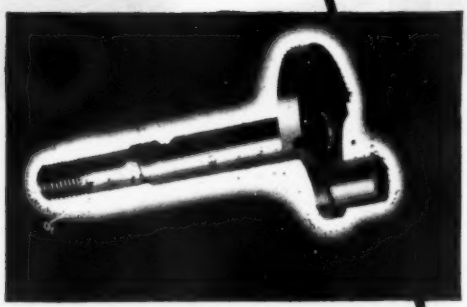

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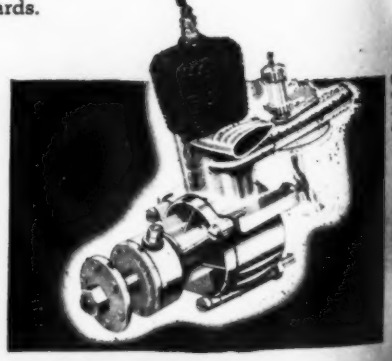

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